MARINE REVIEW

Entered at Cleveland Post Office as Second-class Mail Matter.

VOL. XXI. Published every Thursday at 418-19 Perry-Payne Bldg., by the Marine Review Pub. Co. CLEVELAND, O., JUNE 21, 1900. Subscription $3.00 a year. Foreign $4.50 a year. No. 25

CHICAGO AROUSED.

PUBLIC SENTIMENT SAID TO BE TURNING TOWARDS LAKE SHIPPING—CLAIMED THAT WITHIN TWO YEARS 500-FOOT VESSELS WILL SAIL FROM LAKE MICHIGAN THIRTY-EIGHT MILES INLAND.

Chicago, June 20.—That the Chicago river is going to be improved to accommodate the largest vessels on the lakes is now certain. Within the next two years the 500-footers will be able to sail from Lake Michigan thirty-eight miles inland to the end of the drainage canal. Anybody who would make such a prediction even last year, would have been thought quite too optimistic. But the last six months has brought a great change in public sentiment. The people now want the river improved and what they want they will get.

Chicago is a remarkabe town in its indifference. Affairs will run along for a long time, and the reformer loses all hope. Then, all at once, the people wake up and wonderful things are accomplished. This town never does anything by halves; it is either nothing at all or the whole thing.

Just now the people of Chicago have come to the conclusion that there is something wrong with its business and commerce. There is no doubt but that in the last six months the population has fallen off. While there has been no building to speak of, yet there are more vacant places than there were a year ago. There is no sale whatever for real estate, and all local business seems to be in the dumps. The leaders in Chicago's thought began to look around, and they came to the conclusion that it was because lake commerce had not been fostered more by better harbor improvements. When this conclusion was reached the long struggle for the improvement of the river was won. The prediction can be made right here that Chicago will surprise all of the lake cities by the amount of money she will spend on the river. The same spirit which erected the world's fair is at work on river improvement.

The crying need of changes just now are at State, Twelfth, Canal and Main streets. The channel at these points demands an immediate improvement. Outside of these places the current gives but little trouble to the tugmen.

Were it not for the mysterious thing known as the "market," there would have been long before this a discriminating rate against grain loaded from elevators on the south branch. In other words, this grain would have paid at least an eighth of a cent more than grain on the north branch or at South Chicago. This is on account of Washington street tunnel, which limits cargo on the south branch from 5 to 10 per cent. Vessel agents have fought strenuously against any discrimination and have so far carried their point.

A great deal has been said about the current, caused by the opening of the drainage canal, but the difficulties of navigation do not seem to be as great as they have been represented. Tugmen say that their chief trouble is at night, when they cannot see whether the current is running or not. It will stop suddenly and for a time there will be no current at all. The next thing the tug captain knows the water will be running by his boat at 2 miles an hour. This makes the handling of big vessels in crooked places extremely hazardous. If Chicago tug captains were not the best in the world, serious accidents would have occurred before this. There have been many narrow escapes, but thus far that has been about all. The changes in the current seem to be caused by a shifting of the level of the lake, by which the "head" of water is raised or lowered. There appears to be no way of correcting it.

NEW STEAMBOAT INSPECTION DISTRICT.

Congress at its first session passed an act making the Toledo-Sandusky district an independent steamboat inspecion district. The territory hitherto has been in the Cleveland district. James A. Dumont, supervising inspector general of the steamboat inspection service, in writing to the Review of it says:

"An act of congress was approved by the president on June 2 creating a local board of inspectors at Toledo, Ohio. As it is so near the end of the fiscal year, June 30, the law will not be put in operation until the reports for the quarter ending on that date are received, and can be compiled, so as to determine exactly the number of steamers that were inspected during the year in the Toledo-Sandusky district, so that the salaries of the officers may be exactly determined, as per requirement of section 4414 revised statutes, following the names of ports where boards of inspectors are located. Until such reports are received, I do not think any action will be taken relative to selecting the personnel of the new officers created by the act under consideration."

Salaries of local inspectors in local districts are determined by the number of vessels inspected during the year. The salaries range from $1,200 to $2,500 per annum.

CARNEGIE INVITED TO VISIT JAPAN.

The rumor is in air that Mr. Shibusawa and many influential business men in Japan have sent or are going to send a letter of invitation to Mr. Carnegie, a millionaire in the United States. The motive of these gentlemen for inviting this distinguished man to this country is to encourage our industrial class, because a gentleman who attained the present position by sheer industry and economy, and who is to spend his amassed fortune in the highest conceivable way, will certainly prove a living example to our young business men. His visit will surely help the mighty cause of humanity, and we sincerely hope that he will grace us with his visit to this country where he will no doubt learn and see many things new, strange, and instructive to him.—Japanese Journal of Commerce, Tokyo.

SHIPS OF OUR NAVY.

SOME COMPARATIVE FIGURES FROM SECRETARY LONG—HIS ADMINISTRATION WILL BE MARKED BY THE HIGHEST NAVAL DEVELOPMENT EVER WITNESSED IN AMERICA.

It has been said in truth that the administration of Hon. John D. Long, secretary of the navy, will be marked by the greatest naval achievements of the last quarter of a century, and by the highest development ever witnessed in the American navy; that his policy has been one of advancement along all lines of construction and equipment, and that on his recommendations congress has provided more liberally for the naval establishment than ever before in its history. In reply to inquiries recently on the subject of the navy, Secretary Long said:

"Congress wisely has added to the effectiveness of the new navy. The enactment into law of the naval appropriation bill was in the line of carrying out the policy of the government, entered into seventeen years ago, to make the naval establishment of the United States equal to our needs, if not equal in numerical strength to that of each of the other first-class world powers. The addition of two coastline battleships, three armored cruisers and three protected cruisers will bring the fighting strength of our navy to a formidable standard, although at present we rate fourth in comparative strength as represented by tonnage. With the addition of the eight great war vessels authorized in the last naval appropriation bills the regular United States navy will consist of 231 ships. We have an auxiliary navy of 84 vessels, making a grand total of 315 vessels in the navy, including all types from the first-class battleship to the converted tug.

"In making a comparison with other navies, we take only the effective warships, like battleships, armored and protected cruisers, gunboats, coast defense vessels, torpedo boats and torpedo boat destroyers. Of this character of ships the United States has today in commission, in course of construction, or authorized, 122 ships with a total displacement of 413,525 tons. Germany has 220 ships of 410,805 tons of displacement. France leads Germany, having 417 ships with 765,519 tons displacement, while Great Britain leads all navies, with 506 vessels, representing a total of 1,824,920 tons displacement.

"The policy which brought the American navy from its obscure place among the navies of the world less than two decades ago to the fourth place is, I believe, approved by the American people. The people of the United States want the policy, which was inaugurated during the administration of Secretary Chandler, continued until our navy shall be equal to the needs of our great and growing nation. Today our new navy, ship for ship, is equal to that of any navy in the world.

"Americans are getting an establishment of which they may well be proud, but its supremacy will not lie in the tonnage of the vessels, their armament, their speed or their numbers, but in the superior intelligence of the men behind the guns, and the men who work the ships. The war with Spain fully demonstrated the efficiency and intelligence of the officers and enlisted men of the American navy.

"Under legislation by congress great progress has been made in recent years in building up the navy. The passage of the personnel bill met a long-standing demand in regard to the personnel of the navy. The marine corps was also put on a larger basis by that measure. The great need of new coaling stations has been partly met. Since the Spanish war we manufacture smokeless powder as good as any that could be bought abroad. We make our own guns which are the equal of any to be found elsewhere in the world. It has been the policy in the building up of the new navy to keep abreast of naval progress in improvements and inventions. But we can do much more.

"The necessity exists for a first-class navy. We have to watch and defend a coast line of the United States proper, which, with the shore line of rivers and bays to the head of ship navigation, is seven or eight times that of all the principal European countries. In addition, we have to guard our new possessions and protect the wards that have been entrusted to our care. The eastern situation requires close attention, and American interests and commerce thrive when protected.

"The best and largest function of the navy is to serve commerce in its distribution of our manufactured and agricultural products by preserving the peace so essential to industrial prosperity, surveying the pathway of the ocean, carrying our flag to every shore and establishing new and increasing relations with the consumers of the world. The glory of Manila will be not more in the liberation of thousands of islands of the eastern sea from oppression than in the letting loose of their abundant and undeveloped riches to commerce, and thus to interchange with our manufactured products and thereby to the absorption by their people of our civilization and freedom."

Friends of Mr. L. M. Bowers of the Bessemer Steamship Co. will be pleased to learn that his health has returned to an extent that admitted of his spending a few days in the Cleveland office of the company this week. Mr. Bowers has been compelled to avoid all business matters for some time past. He is no more inclined than any of the rest of the Rockefeller representatives to talk of their plans in connection with the struggle over lake freights that is now going on, but he said he had kept sufficiently in touch with the situation to know that the Bessemer company would take the same stand now on freights that they did in October last if they had it to do over again.

Admiral Dewey has called a meeting of the naval general board at Newport for June 25. The sessions will continue for at least a week in connection with the course at the war college.

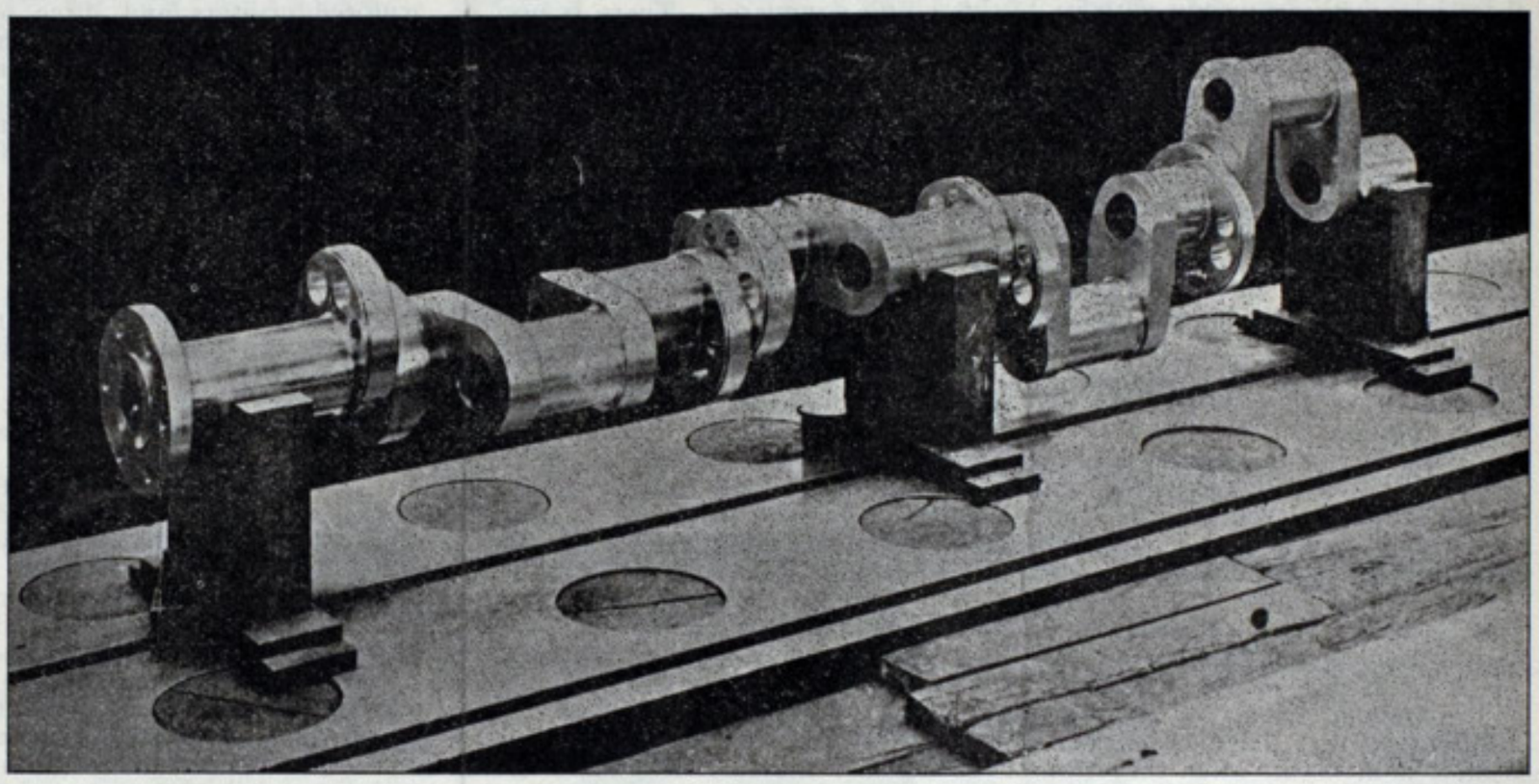
ADMIRAL SAMPSON WAS IN COMMAND.

Admiral Sampson will get $8,335 and Admiral Schley will receive about $4,000 of the prize money to be paid on account of the destruction of the Spanish fleet at Santiago, under the decision that has been rendered by the court of claims. Sampson is formally declared to have been commander-in-chief of the fleet and Schley commanding officer of a division or squadron thereof, on duty under orders of his superior officers. The Spanish squadron is found by the court to have been inferior to the American force and a bounty of $100 has therefore been awarded for every officer and man under Admiral Cervera's command. The total amount of bounty money allowed is $166,700. Besides finding that Admiral Sampson was in command during the battle, the court declares that the New York was among the vessels engaged, and that the Harvard, Resolute and Fern, armed vessels, officered and manned by the United States under control of the navy, formed a part of the fleet under the command of Rear Admiral Sampson and are entitled to receive bounty, as they were each within signal distance of the American fleet or of the flagship New York. The decision concludes as follows:

"Judgment will be rendered in favor of the claimant, William T. Sampson, for his proportion (one twentieth) of the bounty accruing from the destruction of the Spanish vessels, in the sum of $8,335. It is ordered that the residue herein found, to wit, $158,365, be apportioned among the remaining officers and enlisted men of the vessels claiming, to wit, the United States ships New York, Brooklyn, Oregon, Iowa, Indiana, Texas, Gloucester, Vixen, Hist, Ericsson, Harvard, Resolute and Fern, according to their respective rights under the statutes relating thereto."

FOUR-THROW CRANK SHAFT.

A four-throw crank shaft for the United States torpedo boat Stockton is illustrated on this page. It is one of six shafts made by the Bethlehem Steel Co., South Bethlehem, Pa., for the William R. Trigg Co. of Richmond, Va. Four similar shafts were also made for the George Lawley & Son Corporation of South Boston, Mass. These shafts are made of high grade machinery steel (nickel steel), oil tempered, having the following average physical properties from actual test: Tensile strength, 103,894 pounds per square inch; elastic limit, 69,978 pounds per square inch; extension, 22.60 per cent; contraction, 56.64 per cent. The shaft illustrated was forged in one piece of steel weighing 1,800 pounds and turned on thirteen centers. The weight of shaft finished complete is 1,622 pounds.



FOUR-THROW CRANK SHAFT FOR UNITED STATES TORPEDO BOAT STOCKTON.

IMPORTANCE OF CANALS TO NEW YORK COMMERCE.

At the second annual state commerce convention convened at Syracuse recently, Mr. Gustav H. Schwab of the North German Lloyd Steamship Co. spoke on "The Canals and the Foreign Commerce of New York." He said in part:

"The conviction must impress itself upon the mind of every one who considers the elements that enter into the foreign trade of New York, the preponderating importance of the transportation question and the dependence of transportation upon the cheapest possible routes, that the preservation and extension of the foreign commerce of this state and of its great metropolis demand the creation of a waterway between Buffalo, at the end of lake navigation, and tidewater on the Hudson river, that will insure a transportation cost corresponding to the reductions that have been secured on lake and ocean. This can be obtained by the execution of the project recommended by the committee on canals, with the result of whose painstaking and intelligent labors you are familiar, namely, the construction of a canal of sufficient size to take barges with a cargo capacity of 1,000 tons each from Buffalo to the Hudson river. The canal committee calculate that this would reduce the cost of transportation per ton mile to two-thirds of a mill, as against the present cost of Erie canal transportation of about two mills per ton mile.

"The opinion has sometimes been expressed that a deep waterway or ship-canal of some 25 or 28 feet depth connecting Lake Erie with the Hudson is what is needed to enable the producers of the great west to compete with the other countries in the markets of Europe, and surveys are now being made by a board of engineers on deep waterways, the results of which it is expected will shortly be laid before congress. Further investigation of this project will show that a ship-canal would not be economically feasible, and would not be used for the purpose for which it is planned, namely, for the accommodation of vessels that, starting from the upper end of the lakes, can navigate the lakes and canal and cross the ocean. Vessels constructed for lake transportation cannot navigate the ocean, as an entirely different and stronger form of construction is called for on the ocean. Again, canal navigation does not require the form of construction that is necessary for the navigation of the lakes.

"By taking the action that has been recommended by the committee on canals and by the governor of this state, the people of New York, by whom this great question must be decided, will place their state again in the forefront of progress. They will follow the example given them by the people of Canada in the vast improvements now completed in the canal system of the Dominion, and undertaken for the purpose of gaining trade. If we turn to the Old World, we find that the countries of Europe are equally alive to the great advantage offered by water transportation over every other kind of carriage and that they are now spending enormous sums in the enlargement of old and construction of new interior waterways and canals. The citizens of New York have lulled themselves into a false sense of security, blindly trusting to the natural and acquired advantages of New York, and believing that these advantages will defy the open attacks of their competitors and the insidious diversion of their trade to other ports. They must be awakened to a full realization of the fact that the foreign commerce, to which they owe so much, is passing from them. They must be brought to understand that they cannot remain inactive now, but that they must, at any cost, equip their state and city with the most efficient and modern system of transportation connecting lake and ocean to meet the demands of foreign commerce of the present day."

The convention by adopting almost unanimously the report of the committee on canals placed itself on record as favoring an adequate waterway in the state. The report, in substance, stated that the future prosperity of the entire state required the improvement and enlargement of its canals in a manner commensurate with the demands of commerce, and to a capacity sufficient to compete with all rival routes.

IMPROVEMENTS IN ST. LAWRENCE RIVER STEAMERS.

The Richelieu & Ontario Navigation Co. has now its complete service in operation. During the winter many improvements have been made in the vessels of the fleet. The steamer Quebec has had new feathering wheels put on and in place of large paddle boxes formerly used, small ones have been introduced. This gives twelve additional staterooms, besides improving the lighting and ventilation facilities of many more. New fittings for the staterooms, beds, etc., have also been put in all rooms. The dining room has also been refitted. The steamer Montreal has had her staterooms refitted and the dining room and other portions have been redecorated. The steamer Hamilton has received new feathering wheels, which will make her time between Montreal and Hamilton much faster than before. The Hamilton and the Algerian have been put on the Hamilton route, leaving Montreal on Mondays and Thursdays at 7 p. m., in place of 4 p. m. as in previous years. The leaving time at Toronto and Hamilton has also been changed. The steamer Spartan has been refitted throughout and will run between Montreal and Toronto. The steamer Bohemian has been lengthened about 18 feet, making her 198 feet over all. She will run in connection with the Toronto. The Corsican will also run on this route. The steamer Longueuil has been completely rebuilt, improving her facilities to a great extent. The steamer Carolina, Canada and Saguenay have been overhauled and will operate as usual on the Saguenay line. The running time between Montreal and Toronto has been shortened by three hours, owing to the improved steamers and the new Soulanges canal, which will be used.

NAVAL MATTERS.

The itinerary of the training ship Saratoga is as follows: Arrive at Southampton July 11; leave for Havre July 31; leave for Gibraltar on August 10; leave for Maderia Sept. 1; sail for home Sept. 15.

It is announced that Secretary Long has decided to name one of the new battleships Virginia and the other Washington. Thus Virginia is doubly honored since it produced Washington and gave the name to the great state on the Pacific coast.

The North Atlantic squadron, comprising the flagship New York and the battleships Kearsarge, Massachusetts, Indiana and Texas, mobilized at Boston last week for a cruise which will extend two or three weeks before returning to Newport. The Kentucky, after being docked at New York, will join the squadron and will take part in its evolutions during the early summer months. The present squadron comprises the most powerful ships attached to the home station for many months.

The battleship Kentucky will have her official two-days' sea trial trip beginning on the 25th inst., after which she will be assigned to the North Atlantic station. The trial will begin at some point off Newport, where the inspection board will join the ship. She has already had her official speed trial and has been accepted by the navy department in a preliminary way. The coming trial is simply to make sure that the ship and all her parts fulfill the contract requirement. The ship has been in commission for the past two months.

One fare for the round trip within a radius of 200 miles on the Nickel Plate road on July 3 and 4. Tickets good returning until the 5th, inclusive. Write, wire, 'phone or call on nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, or E. A. Akers, C. P. & T. A., Cleveland. 106, June 28.

PRICES OF SHIP STEEL.

REDUCTIONS WILL PROBABLY RESULT IN ORDERS FOR NEW VESSELS—A SHIP FOR CAPT. JOHN MITCHELL AND OTHERS—NOTES FROM THE LAKE YARDS.

Prices of ship building material are getting down to figures that will very probably result in the lake yards soon securing new orders enough to fill up for 1901 most of the berths that are being vacated by ships now going into commission. Of course it is not expected that the new work will equal the rush of the past year, but with most of the vessel owners working on profitable contracts the number of orders may be larger than was looked for. The order this week from Capt. John Mitchell and others of Cleveland for another large freight steamer was placed with the American Ship Building Co. through Mr. Robert L. Ireland, who was with the Globe company before the consolidation, and it is therefore expected that the new vessel will be built at the Globe yard, Cleveland, where the other four large steel steamers of the Mitchell fleet were built. The new steamer is to be practically a duplicate of the W. E. Reis—about 6,000 gross tons capacity and equipped with triple expansion engines and Scotch boilers. It is reported that ship plate may now be had as low as $25.50 a ton at Pittsburg. In the period of great depression some time ago a few orders for plate were taken as low as $20 a ton. There is, of course, a scramble for business in plate that does not prevail in shapes. But the manufacturers of shapes, who are in a combination, have also reduced their prices. The combination prices now are $38 a ton (Pittsburg) for beams and angles and $36 a ton for frames, as against a price of $45 a ton that has prevailed for some time past on all kinds of shapes. The reduction, therefore, is $7 a ton on beams and angles and $9 a ton on frames. At the Cleveland works of the American Steel & Wire Co., where no shapes have been rolled for a long time past, a mill has been turned onto that kind of work, and it is expected that similar moves in other parts of the country will soon result in lower prices on this kind of structural material.

The Rockefeller steamer Charles R. Van Hise was launched at the yard of the Superior Shipbuilding Co., Superior, Wis., on Saturday last. She is the biggest boat ever built at the yard, which has during its existence built forty-four boats. Over all the vessel is 461 feet long. Her beam is 50 feet and depth 29 feet 6 inches. The vessel's capacity is 6,800 gross tons on 18 feet draught. There are three steel deck houses for officers, crew and engineers. The Van Hise will be a powerful freighter as her quadruple expansion engines are of about 2,000 horse power. She was christened by Miss Dorothy Olcott of Duluth. The Van Hise is named for Prof. Hise of the University of Wisconsin, the author of various works on the iron bearing region of the Lake Superior district.

The plans of the proposed buildings of the Dry Dock & Steel Ship Building Co. of Collingwood, Ont., have been completed. At first three buildings, a punch shop and molding loft, a furnace and blacksmith shop and an office will be erected. The first, which will stand on the east side of the dry dock, will be 220 by 50 feet with an addition for a boiler and engine room. The greater portion of the heavy machinery will be on the ground floor. The furnace and blacksmith shop will be 120 by 50 feet and will contain the plate and shape furnaces, the hammer and blacksmith shop. The office building will be 24 by 60 feet and two stories high with a large garret, which will be used for a blue print room.

A wooden steamer of about 2,800 tons capacity was launched at the ship yard of Simon Langell, St. Clair, Mich., on Saturday last and named Alfred Mitchell in honor of the well-known Cleveland vessel owner of that name. The new vessel is 270 feet over all, 40 feet beam and 25½ feet molded depth. She is valued at about $100,000. Engines are of the fore-and-aft compound type with cylinders of 23 and 48 inches diameter and 40 inches stroke. Steam will be supplied by a Scotch boiler of 13½ by 13½ feet. The vessel was practically ready for service when launched. She has iron boiler house, iron bunkers, steam steerer and all other modern improvements.

It is said that the Rideau Navigation Co. will have a sister boat to the steamer Rideau Queen built at Kingston this summer. The steamer James Swift will then be used for excursion purposes after being altered for that business.

Final touches are being placed on the big Eddy steamer Simon J. Murphy at the Wyandotte yard of the Detroit Ship Building Co. The boat will be launched at 2 o'clock Saturday afternoon.

ATLANTIC AND PACIFIC COASTS.

WHAT THE SHIP BUILDERS ARE DOING IN THEIR VARIOUS YARDS—A NOVEL EXPERIMENT AT THE TRIGG WORKS.

Engines of the United States torpedo boat Stockton, now approaching completion at the works of the W. R. Trigg Co., Richmond, Va., were subjected to a rather novel test recently. Air in place of steam was employed in the trial and the experiment was a pronounced success in every respect. With an air pressure not exceeding 80 pounds per square inch the engines worked with perfect freedom from vibration, although not secured to the bed plates or in any way braced to any standard. The reversing and other gears worked admirably, foreshadowing the success of the machinery when subjected to the official sea test on the government trial. Considerable interest attaches to this unusual test, for it is believed to be the first instance where steam machinery of any considerable size has been tested for adjustment by air instead of steam pressure. The builders are much gratified over the results obtained by the first engines built in their shops.

C. H. Osborn, representing the ship yard of William R. Osborn, Croton-on-Hudson, N. Y., launched a week ago the new steamer Natoma into Harvey's Lake, Luzerne county, Pa. The vessel is a wooden passenger propeller 77 feet long over all, 18 feet beam and 5 feet depth of hold. The passenger capacity is 400. The Natoma has a fore-and-aft compound engine from the Norris Machine Works, Baldwinsville, N. Y. It has 8 and 14 inch cylinders by 10 inches stroke. There is a condenser and a Worthington air and feed pump. The boiler is of the vertical type, 8 feet 6 inches high and 5 feet 6 inches diameter. The Natoma is owned by the Lake Transit Co., Wilkesbarre, Pa.

The Eastern Ship Building Co., New London, Conn., which has a contract from J. J. Hill of the Great Northern Railway Co. to build two immense steamers, is rapidly getting its plant into shape. Work on the steamers has also been begun. They will require for their construction roughly about 20,000 tons of iron and steel. Each vessel is to be 625 feet long and 73 feet beam with a depth of 32½ feet. The displacement will be 33,000 tons and the net tonnage (measurement) 18,000 tons.

Henry A. Lozier of Cleveland, O., is contemplating the erection at Plattsburgh, N. Y., of a plant for building gasoline engines for automobiles, and for marine and stationary purposes, if suitable arrangements can be made. He would also build pleasure craft. The buildings would include a machine shop, 80 feet by 250 feet; a foundry, 75 feet by 150 feet; a boat house, 150 by 200 feet; a blacksmith shop, 75 by 100 feet, and other structures.

The estate of Hugh Ramsey offers for sale the ship yard and ship building plant at Perth Amboy, N. J., twenty miles from New York and twelve miles from Sandy Hook. The harbor is commodious and the depth of water in the channel in front of the ship yard is 40 feet. The plant consists of a machine shop, boiler works and blacksmith shop, office and ship building sheds. The machine shop is well equipped with tools.

Keels for three new schooners are stretched at the New England Co.'s yard, Bath, Me. One is for Capt. W. H. Potter of Orient, L. I. Another is for Capt. Thompson of Jersey City, N. J. The third is for Capt. G. L. Kelsey of Clinton, Conn. Measurements of the latter are 182 feet long, 40 feet beam and 18 feet deep, and she will have four masts.

The ship building and repairing plant of Messrs. Townsend & Downey, nearing completion at Shooter's island, in the Kill Von Kull, near New York, received a great set back by the destruction of the new machine shop and the damage to machinery there by fire on the night of June 5. The loss is estimated at $100,000.

The steamers Norfolk and Washington will go in turn to the Maryland Steel Co.'s ship yard at Sparrow's Point, Md., to have extensive alterations made. Each boat will be fitted with four new boilers, and the upper tier of staterooms on the third deck will be extended aft. The repairs will cost $130,000.

The two new steamships which the Pacific Mail Steamship Co. is having built at the ship yard of the Newport News Ship Building & Dry Dock Co. will each cost $2,000,000. These steamers are on the stocks and will probably be launched in the fall. The Pacific Mail company has lately purchased the large cargo steamship Algoa for $398,592.

It is expected that the torpedo boat Barney will be launched from the ship yard of the Bath Iron Works, Bath, Me., on July 10. The keel for the torpedo boat Biddle will be stretched on the blocks made vacant by the Barney. The torpedo boat Bagley will be launched in August.

Knox & Son of Marietta, Ohio, have made bids on the hulls for two new stern-wheel steamboats, 225 feet long, which it is understood are for the Pittsburg and Louisville trade on the Ohio river in connection with the steamboat City of Pittsburg.

Bids were opened last week by the navy department for three sets of surface condensers and one twin type-feed water filter. The bids were as follows: Wheeler Condensing & Engineering Co., 120 Liberty street, New York, $4,620; M. T. Davidson, 43 Keap street, Brooklyn, $4,405.

The Standard Oil Co., after three failures, has at last floated the tank steamship Maverick, which has since last July been on the bottom of Halifax harbor. The vessel was burned with 400,000 gallons of oil in her tanks. She was raised with pontoons built for the purpose.

Sawyer Bros., Millbridge, Me., are considering an offer by New York parties for a four-masted schooner of 12,000 tons and a three-master of 500 tons, to be put in frame this season. The firm has received Oregon spars for a three-mast schooner now building.

A finely-modeled launch for J. D. Hilder of Newport, R. I., is now on the stocks at the ship yard of the Mystic Ship Yard Co., Mystic, Conn. The lines of the boat are perfect for speed. She will be ready for service this summer.

The keel of the big schooner to be built by George L. Welt, Waldoboro, Me., has been laid and its extreme length is 257 feet, which is 25 feet longer than the famous Gov. Ames. The Welt yard covers fifteen acres.

T. S. Marvel & Co., Newburgh, N. Y., launched the new ferryboat John Englis for the Brooklyn & New York Ferry Co., last Saturday.

George E. Currier & Son of Newburyport, Mass., have just signed a contract to build a four-masted schooner for New York parties.

ALONG THE PACIFIC COAST.

According to the San Francisco papers the Pacific Coast Steamship Co. is contemplating the construction for the San Francisco, Victoria & Alaska run of another passenger steamship. She is expected to be 270 feet in length over all, with a breadth of 40 feet, or a trifle smaller than the steamer Queen. Modern equipment is to be her main feature, electricity being a special characteristic, with an observatory occupying the entire after portion of the hurricane deck.

A steam schooner 100 feet long, 24 feet beam and 9 feet deep, is being built at Supple's boat yard, Portland, Ore., for coastwise service between Astoria and Tillamook. Two stern-wheel steamers, to be named the Klickitat and the Umatilla, the former 201 feet long and to carry 600 tons freight, the latter 165 feet long and to carry 350 tons freight, for use on the river above Portland, Ore., are being built by J. Pasquet of Portland.

At Lindstrom's yard, Aberdeen, Wash., a schooner is on the ways for the West & Slade Mill Co. of that place. She will be launched in July. A schooner lately launched from this yard is named A. B. Johnson and is 167 feet in length by 37 feet beam and 13 feet deep. She will be rigged as a four-master and will carry 700,000 feet of lumber.

Bendixen's ship yard on Humboldt bay, Cal., recently launched the Nome City, built for W. A. Mitchell & Co. of San Francisco. The Nome City has a net tonnage of 950 tons and is the 162nd vessel built on Humboldt bay.

The Anderson-Middleton Mill Co., Aberdeen, Wash., is having a four-masted schooner constructed in the yards of E. Cummings at that place. She will carry about 800,000 feet of lumber.

PACIFIC MAIL STEAMERS.

PARTICULARS OF THE LARGE VESSELS BUILDING AT NEWPORT NEWS—THEY WILL BE READY FOR SERVICE IN ABOUT A YEAR.

The two steamers building for the Pacific Mail company at the works of the Newport News Ship Building & Dry Dock Co. will not be as large as the Hill steamers to be built at New London, Conn., but they will be magnificent vessels. They will class with the best ships in transatlantic service. Going into commission about a year from now, these vessels will be put on between San Francisco and Hong Kong, with Honolulu, Yokohama and Nagasaki as ports of call. They will be capable of making a sustained sea speed of 18 knots.

Following are the dimensions of the new vessels: Length between perpendiculars, 550 feet; length over all, 572 feet 4 inches; beam, 63 feet; depth, 40 feet; draught, 27 feet; displacement, about 18,600 tons. Accommodations will be provided for 200 first-cabin passengers, thirty white steerage and 1,200 Chinese. Quarters for the latter are arranged so that the space may be utilized for other purposes, if unoccupied by Chinese. The hulls will be constructed of steel, with frames spaced 32 inches apart throughout. A double bottom extends from stem to stern and is carried up to the turn in the bilge. There are four decks extending the whole length of the vessels, known as the lower, main, upper and promenade decks. In addition to these are the orlop and boat decks.

Machinery of vessels of this kind is, of course, of most interest. The main engines consist of two four-cylinder quadruple expansion engines of the vertical, inverted, direct-acting type, placed abreast of each other in separate water-tight compartments. The cylinders are of the following dimensions: High pressure, 35 inches; first intermediate pressure, 50 inches; second intermediate pressure, 70 inches, and low pressure, 100 inches diameter, with a common stroke of 66 inches. The engines are designed to develop 18,000 indicated horse power, while running at eighty-six revolutions per minute. The cylinders are arranged in the following order: High pressure forward, low pressure, second intermediate pressure, and first intermediate pressure aft. The engine framing consists of cast-steel columns of I section, secured to the cylinders and bed plates. The bed plates are also of cast steel. The valves are of the single-ported piston type and are of cast iron. The link motion is the Stephenson link type. All the cylinders are steam jacketed. The piston rods are of forged steel fitted with cast-iron crosshead slippers lined with Parson's white bronze, which work in cast-iron crosshead guides. The connecting rods are of forged steel 138 inches long between center of crank and center of crosshead pin. The pistons are of cast steel and are of the dished pattern. The eccentrics are of cast iron keyed to the crank shafts. The eccentric rods and valve stems are of forged steel, the former being secured to the eccentrics by composition straps. Each main engine will be fitted with a steam and hydraulic direct-acting reversing engine and a 7-inch and 7-inch by 5-inch turning engine. The thrust bearings will be two in number, of the ordinary horseshoe type, with fourteen shoes to each bearing. The stern-tube bearings will be of the ordinary brass sleeve pattern, fitted with lignum vitæ. The crank shafts will be forged steel in four interchangeable sections. The thrust, line and propeller shafts will also be forged steel. All shafts will be hollow. From the stern tube stuffing-box to the propeller hub the propeller shafts will have sleeves of composition, to protect against the corrosive action of the sea water. The propellers will be of the three-blade type, the hubs being cast steel and the blades bronze. There will be two main condensers, one for each main engine. Each main condenser will have an independent air pump and two circulating pumps, the circulating pumps to be operated by a compound engine. Two auxiliary condensers will also be provided with combined air and circulating pumps attached. Two feed-water heaters will also be installed.

The boilers are to be nine in number, eight main boilers and one donkey boiler, of the horizontal, return fire-tube type. The arrangement of boilers is as follows: One donkey boiler on the upper deck in the boiler hatch; main boilers placed in a fore-and-aft direction in two compartments, with all fire-rooms athwartship; in the after boiler compartment two single-ended and three double-ended boilers, and in the forward boiler compartment three double-ended boilers. All these boilers are of Scotch type and the steam pressure is 200 pounds in donkey boiler as well as in the main boilers. The diameter of single-ended and double-ended boilers is also the same, 16 feet. The two single-ended boilers will have four furnaces with 76.58 square feet of grate surface and 3,208 square feet of heating surface. The six double-ended boilers will have eight furnaces with 153.16 square feet of grate surface and 6,416 square feet of heating surface.

REAR ADMIRAL HICHBORN ON THE SUBMARINE BOAT.

Rear Admiral Philip Hichborn, chief constructor of the navy, has an interesting article on submarine torpedo boats in the Engineering Magazine. He says: "The securing of our coasts so that our fleet may be free to do its legitimate offensive work is most assuredly a most important duty. Can submarines do it? I have never heard a naval man of any nationality express the opinion that any battleship in the world could prevent, by her gun-fire or otherwise, the approach of a submarine of the efficiency of the Holland, although many who have not seen her are quite positive that she can not do what she does do, and has been reported as doing by a most careful board of officers. A sharp lookout would reveal the approach of a submarine in the daytime, and she might be picked up by searchlights at night, as she rose to correct her course, although the chance of this would be very small, since she could readily avoid the searchlight 'lanes' arranged for defense against surface torpedo boats. When revealed she could be avoided by retreat, since her lack of speed would not enable her to chase a fast ship with any chance of success. Torpedo destroyers and other small craft thrown out in advance of the heavy ships could not stop her, since she could avoid them by diving, and could continue to hold her course for the ships. If she were allowed to approach within good torpedo range her chance of delivering a torpedo that would put any ship out of the fight is exceedingly good, while the chance that a lucky shot from the enemy would destroy her as she rose and before her torpedo was sent is extremely small."

WHITE'S "NAVAL ARCHITECTURE."

The fifth edition of White's "Naval Architecture" has just been published. This is the foremost publication of its kind in existence. Sir William H. White is the director of construction in the British navy. The contents of the book have been well described in the preface written by Sir William White. He says:

"The first edition of this book grew out of lectures delivered at the royal naval college to naval officers and others studying there. In these lectures it was my endeavor to popularize and explain some of the many problems of naval architecture in a manner which should be intelligible to those who were interested in or connected with shipping but not engaged as naval architects or ship builders. Many officers who attended the lectures requested that they might be published; and from ship owners, yachtsmen and other persons came inquiries for a book containing, in popular language, a comprehensive summary of the theory of naval architecture. Existing treatises had been written mainly for the use of those who desired to obtain an acquaintance with the subject which would fit them for the practice of ship designing. To benefit by these treatises a considerable knowledge of mathematics was necessary. There was obviously a want in the literature of naval architecture; and, in its original form, this book was intended to supply that want, and to enable persons outside the profession of the naval architect to obtain a general acquaintance with the principles of construction, propulsion and behavior of ships.

"The book was written, therefore, in popular language; and the mathematics introduced were of the simplest character. Explanations were given of many terms and mechanical principles which required no explanations to readers possessing a good knowledge of mathematics. The details of theoretical investigations were omitted, but the general modes of procedure were sketched, and the practical deductions fully explained and illustrated. From this point of view the survey of the theory of naval architecture was made as complete as possible. The principal deductions from theory representing the buoyancy, stability, behavior, resistance and propulsion of ships were set forth at length. Practical rules were given for regulating the draught and stowage of ships, estimating their tonnage, and approximating to their stability. Writing largely for the information of seamen it was my endeavor to awaken in their minds an intelligent interest in the observations of deep sea waves and the behavior of ships. Such observations, carefully made and properly recorded, are of the greatest value to future ship designing, and from the nature of the case can only be made by seamen. Practical ship building was not treated in any detail, but a comprehensive sketch was given of the structural arrangements in various types of ships, of the relative qualities of the principal materials used in ship building, and the principles which govern the work of the ship builder in providing the strength necessary to resist the action of the various straining forces to which the hulls of ships are subjected during service at sea. It was anticipated that such a book, while primarily designed for the use of naval officers (in the royal navy and the mercantile marine), ship owners and yachtsmen, would prove useful also as an introduction for students of naval architecture to more formal and mathematical treatises, while it would serve as a book of reference for naval architects, ship builders and marine engineers.

"These anticipations were realized. The book has had a wide circulation in all parts of the world. The admiralty has approved it as a text-book for officers of the royal navy. The naval authorities of Italy and Germany have similarly approved of translations of the work. It has been extensively used by the classes for whom it was originally undertaken—naval officers, ship owners, yachtsmen and others interested in shipping. It has become a text-book for students of naval architecture and has been welcomed by professional men engaged in the design and construction of ships and propelling machinery.

"A second edition was issued in 1882, revised and enlarged. Since that time the work has been reprinted without revision. Pressure of other work prevented me from undertaking a task which became increasingly necessary as time passed and progress was made in ship building. At length the demand for a new edition became imperative, and under very difficult conditions, arising out of responsible and heavy official duties, the task now completed has been carried out, occupying my scanty leisure for nearly two years. In this edition the general arrangement previously adopted has been maintained. A large portion of the book has been re-written, and it has been considerably increased in size. All the sections have been carefully revised and brought up to date. The notable advance made during recent years in the application of scientific methods to merchant ship construction has made it possible to add greatly to the information given in regard to the stability, strength and propulsion of vessels of various types. Important inquiries and legislation have taken place also since the previous edition appeared, dealing with the load-line, the tonnage, and the water-tight subdivision of merchant ships. These subjects have been summarized and discussed and the information brought together will be of interest to many readers.

"The section dealing with steamship propulsion is practically a new and much extended treatment of this important subject. An endeavor has been made to summarize and digest the most recent and valuable theoretical and experimental investigations bearing on steamship performance and the efficiency of propellers. In the chapter on sailing ships will be found a careful resume of the latest investigations of the laws of wind pressure."

The book is published by the D. Van Nostrand Co. It is sold by the Marine Review Pub. Co. Price $9.

Pig iron prices have been declining, and the outlook for some time has been discouraging, yet the production of pig iron during May actually increased, as shown by the fact that furnaces in operation on June 1 represented a weekly capacity of 2,526 tons in excess of the capacity of the furnaces in operation a month previous. The stock of pig iron, excluding stocks held by steel works, increased during the month 93,603 tons. It is true that since the first of June quite a number of furnaces have been blown out, and others are to be blown out shortly. It is a question, however, whether the decrease in production will be sharp enough to cause a better condition to prevail in pig iron.—Iron Age.

PROPOSED CAR TRANSFER AT DULUTH.

A sketch of a proposed suspended car transfer across the ship-canal at the entrance to Duluth-Superior harbor is presented herewith. The bridge is to connect Minnesota point with the main land at Duluth. Of course it would be necessary to have plans for a structure of this kind meet with the approval of the war department and the shipping interests, and it is understood that the sketch submitted herewith, as well as all other particulars of the bridge, will be considered shortly by the legislative committee of the Lake Carriers' Association at Buffalo. The Duluth interests would like to have the bridge satisfactory to the vessel owners, but at the same time they would like to minimize the expense by avoiding any unnecessary height above the water. It is said that if the truss were 100 feet above water all vessels could pass under it except a very few of the old schooners carrying top masts. On some of these schooners the top masts are nearly 147 feet above water. In view of the fact that one of these schooners might not want to enter Duluth harbor more than once a month, and in view of the fact that there is another entrance to the harbor at the Superior end of Minnesota point where there is no bridge or structure of any kind, the question arises as to whether vessel interests are willing to say that they would be satisfied with a height above water at the Duluth end of 100 feet. Of course the further question remains as to whether the obstruction caused by the car transfer when in actual operation is anything that the vessel interests would object to.

Any proposition of this kind will, of course, be very carefully dealt with by the Lake Carriers' Association, on account of its probable bearing on the important matter of a bridge over the Detroit river, which the vessel interests have fought successfully for a great number of years past.

CARNEGIE'S COAL ENTERPRISE.

Mingo valley coal lands owned by the Carnegie Steel Co. will be opened to lake and river trade through the medium of a new railroad projected by that company and now being laid out by a corps of engineers between Duquesne and Monongahela City, Pa. The new road will be known as the Monongahela Southern Ry., and will connect at Duquesne with the Pittsburg, Bessemer & Lake Erie (Carnegie road from Conneaut to Pittsburg), furnishing a branch line and material to increase the freight traffic from Pittsburg to the lakes.

The Carnegie company has been developing this project for several months. The road is made necessary because the freights hauling ores and raw material from the lakes to the Carnegie works in this city are compelled to return practically empty, thus losing time and money in transferring the cars, when they could be utilized at a profit in carrying coal and raw material back to Conneaut harbor for lake trade. A corps of engineers has been working on a new route between Duquesne and Monongahela City and has located several available routes, one of which will probably be selected at a meeting tomorrow. Officials of the company will go over the routes laid out, and the best grade and shortest route that can be built at least cost will be selected. The surveyors have gone over many miles of one of the worst countries in the state, and have complained repeatedly to the farmers in Washington county of the difficulties to be overcome in locating a road that will be practical and cover the least ground. The country is mountainous, filled with gullies, and offers little encouragement to engineers.

The new route will be about twenty-one miles on a bee-line from Duquesne and passes through Allegheny and Washington counties, terminating at Mingo valley. The country is full of coal of the best grade, most of which has been optioned by the Carnegie company. The new road will open up the entire territory between the Carnegie works at Duquesne and Mingo valley and will greatly increase the return traffic over the Carnegie road, the Pittsburg, Bessemer & Lake Erie. When the line is completed it will cross the Wheeling division of the Baltimore & Ohio road twice and will be one of the best short roads in the state. Coal will be taken out at different points along the line of the road and shipped north. It will be a double track road, and the finest steel rails and other materials will be used in its construction, which will commence as soon as the route is finally settled, it is said.—The Coal Trade, Pittsburg.

The deepest ocean temperatures recorded were taken by the United States survey steamer Nero in sounding for the proposed submarine cable between Guam and Midway islands. At a depth of 5,070 fathoms, or 30,420 feet, the temperature was 35.9 degrees Fahrenheit, and at 5,101 fathoms, or 30,606 feet, it was 36 degrees Fahrenheit. The previous deepest temperature record was taken by the British survey steamer Penguin in depths of 4,700 and 4,800 fathoms.

SHIP LIFTED OUT OF THE WATER.

DERRICK AND FLOATS USED FOR INSTALLING PROPELLER SHAFTING UNDER TORPEDO BOAT SHUBRICK—NOVEL OPERATION.

By Commander Harrie Webster, U. S. N.*

The torpedo boat Shubrick was launched by the builders, the Wm. R. Trigg Co., Richmond, Va., before her propeller shafting had been installed, for several reasons, the principal of which being the otherwise readiness of the vessel long before the contractors for this shafting were able to make delivery, and the desirability of clearing the ways as soon as possible. The launch was made on the last day of October, 1899, but it was March, 1900, before the propeller shafting was ready to be put in place, and as Richmond is some hundred miles or so from the nearest dry dock, it became a question of considerable moment touching time and expense, as to whether the long trip and the cost of docking could not be obviated. This question was promptly solved by the builders' determination to simply raise the stern of the Shubrick sufficiently free from the water to enable the work to be done from floats conveniently placed; and the complete success with which the scheme was carried out, together with the slight comparative cost, makes the event well worthy of special notice by ship building and engineering experts.

Commonly speaking, the steel ship, large or small, is supposed to be in the condition of a single element of a bridge structure, and consequently possessing the ability to withstand suspension at any point within the vertical through the center of gravity without distortion or danger. This, however, like many another general hypothesis, is only true within very small limits, and if the attempt were made to suspend a steel craft of any considerable dimensions from a point in the keel directly beneath the center of gravity of the vessel considered as a unit, the result would be disastrous. The normal strains to which a floating structure is to be subjected are, as is of course well known, those incident to perfect equability of stress over a large percentage of the exterior area of the floating body, and in addition to its equability is the further advantage of the perfect mobility of the liquid in which the vessel is held in suspension. So far as it is a matter of record, the raising of a torpedo boat from the water for the purpose of carrying on work actually beneath the vessel is an operation which has not been attempted in this country without the aid of a dry dock.

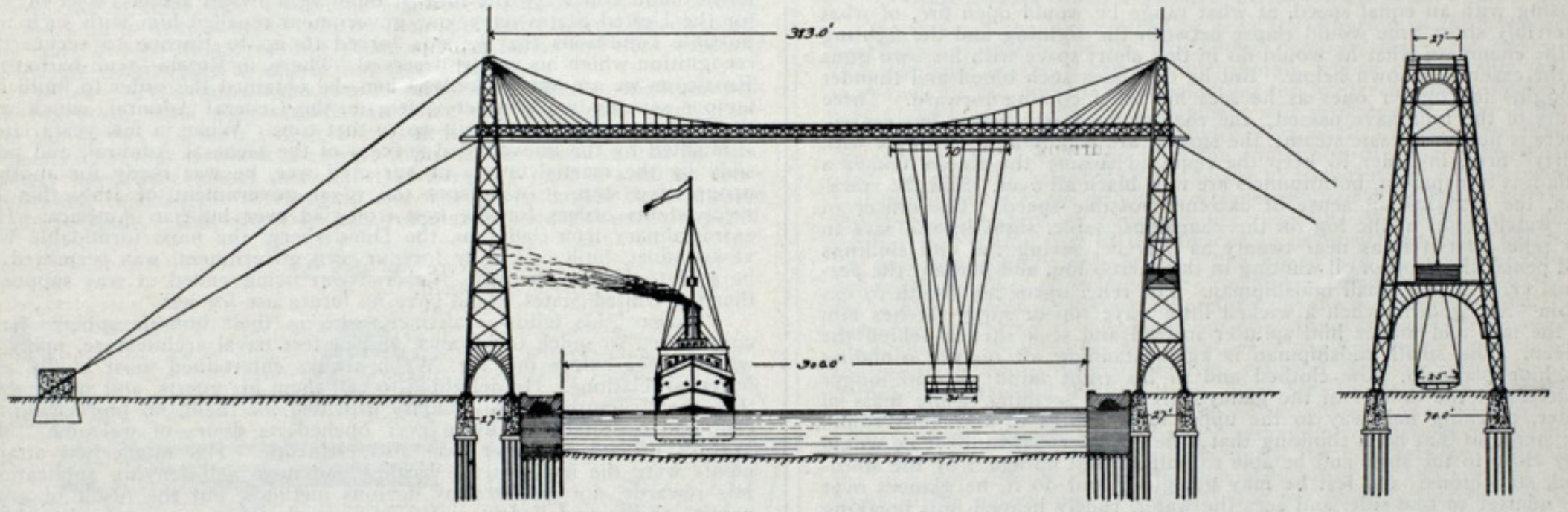
Before beginning the work the bow of the Shubrick was depressed by the inletting of about twenty-two tons of water in the forward compartment, facilitating the immersion of the stem and adding to lateral stability during the suspension. The smooth water of the canal also was a favorable condition, but even with security from disturbance on the part of this element, the daring feature of the attempt remains as an illustration of the confidence the builders held in the excellence of the hull work, especially when it is remembered that the hull plating of a torpedo boat is but about 1-8 inch thick, and that the length of the Shubrick is 175 feet.

Dimensions of the derrick used in the operation are: Length, 53.08 feet; breadth, 31 feet; depth, 6.66 feet; draught, normal, 2 feet; displacement, at 2 feet draught, 92 tons; displacement, with Shubrick hoisted, 137 tons; dead weight on the derrick float with the Shubrick hoisted, which includes men, shafts, and all tackle, 45 tons.

The twenty-two tons of water which was let into the Shubrick was between the stem and bulkhead No. 27. The approximate length of the Shubrick from point of emergence to perpendicular stern line was 62.5 feet, being somewhat more than one-third of her total length.

The expense attending this method of installation of shafting is given by the superintendent as follows: Fifteen men from machine department, $70.97; twenty men from ship yard, $51.35; use of derrick for seventeen hours, $110.50; total, $232.79. A careful examination made during the period of the vessel's suspension failed to show that any undue strain was imposed on the framing or plating, and the fact that the shafting was emplaced without difficulty was prima facie evidence that such was the case. The cost of docking the Shubrick at Norfolk or Newport News, with incidental expenses due to towing, insurance and delay in work, and other expenses, was estimated by the contractors as in the neighborhood of $1,000.

*From Journal of American Society of Naval Engineers, Washington, D. C.



PROPOSED CAR TRANSFER OVER SHIP-CANAL AT DULUTH.

The steamer Commonwealth, one of the largest and fastest passenger vessels that will ply between Liverpool and Boston, was successfully launched last week at Belfast, Ireland. She is the property of the Dominion line and is 600 feet long, 60 feet beam and of 13,000 tons burden. She will go into commission in August.

DESCRIPTION OF A FULL SPEED SEA TRIAL.

The midshipman of the morning watch, standing aft, barefooted, on the sounding machine platform, watches the galley's crew closing the captain's watertight door to the sternwalk, wonders a little, and goes down to call his relief. A grimy stoker, easing off the funnel guys, gives the last turn to the screws, takes his last breath of fresh air, and climbs down and down again into the stokehold—the place where heat is being converted into energy. The boatswain looks over the bows, and sees that the wire slip rope is arranged to his liking. The powers that be appear on the bridge; a few calm orders are given, passed and received, the effect of which is to change the state of the ship which contains the midshipman, the stoker, the boatswain and the powers from a state of being "at anchor" to that of being "under way," and then to that of being "under way and moving through the water;" slowly at first, to get clear of the harbor, then increasing every ten minutes as the speed is worked up for a four hours' full speed trial.

And now a muffled and shaky message comes up to the bridge that the trial has begun. Yes, surely it has; do not three of your five senses tell you so? Climb up on the shaking bridge, it is there; go down to the cinder-covered quarterdeck, it is there; go into the uttermost parts of the screw alley, it is there also. On the bridge, trembling as if it would wrench itself off the conning tower, the officer of the watch is glad to get behind the shelter of the glass screen, for the speed has converted a light breeze into half a gale of wind; he can there watch, with a little more comfort, the movements of the ships that are to be passed by, as if at anchor, and incidentally the white curling wave at either bow, the leadsman in the chains, with his chinstay down, trying to heave his lead against the wind, and the lookout trying to find a lee behind the 3-pounder gun shield.

Of a sudden comes a deep-toned roar, as of the loudest note of a giant organ played fortissimo, a sound which indicates that one boiler, at least, has reached its safe working load and cries with its huge lungs "Enough!" From the funnels no black smoke emerges from the Welsh coal, but transparent vapor, which, mingling with the feathery waste steam, strangely warps the mainmast and streaming pennant seen through it; their gay canary color is peeling off from the heat, leaving great, ugly, black patches that will soon spread all over them. The foremost one is rocking to and fro from the vibration. The officer of the watch turns again and takes another look at a "tramp," which is being rapidly overhauled, and his thoughts, directed by noise and shaking and speed, turn to thinking of the "real thing," or how often one could hit the opponent, passing with an equal speed, at what range he would open fire, of what a terribly short time would elapse between the sighting and the fighting of the enemy, of what he would do in that short space with his own guns in the casemates down below. But he dismisses such blood and thunder thoughts for lighter ones as he sees his relief coming forward. Three hours of the four have passed; the roar of the safety valves has ceased. There is no more waste steam; the stokers are beginning to struggle with "dirty" fires, in order to keep the required steam; the smoke comes a little less transparent, both funnels are now black all over. Still the vibration, the intoxicating sense of extreme possible speed. The officer of the watch looks at the log on the charthouse table, signs it, and says to his relief that it is as near twenty as may be, saving the odd shillings and pence, the drop of oil wanting in the cherub log, and perhaps the personal error of the small midshipman. The relief opens his mouth to exclaim "Ah, good!" when a wicked little wave top of spray catches him in the face and makes him splutter instead and seek shelter behind the screen. The small midshipman is again standing aft on the sounding machine platform, now clothed and in his right mind; he no longer wonders at the doings of the galley's crew. A seething, white mass of water, reaching half way to the upper deck, clings to and boils round the stern, so that he is thinking that if he fell overboard into it he would stay close to the ship, and be able to pull himself up again by the sternwalk stanchions; and lest he may get giddy and do it, he glances over the quarter to one side, and sees the water, rudely heaped into breaking waves, tearing past at 20 knots. He thinks better of it, knowing that he would be a good mile astern before a boat could be lowered, and goes below, to find his overhead locker shaken down and all his household goods and the photographs of all the only girls he ever loved strewn about the gun room and on the deck, wet from a leaking scuttle. He picks them up and, looking round to see that none of his merciless messmates have seen the dance program with the little bit of golden hair sticking out, puts them away, more safely, in the private till of his chest.

Just open one of the doors leading down to the engine room, and look down upon the mighty beatings of the vessel's heart; take the proffered bit of cotton waste and go down backward, holding on to both rails, and keep your elbows to yourself; and as you descend realize more and more fully that here, here indeed, is the full speed trial itself in all its glory. The noise of twenty different engines strikes the ear, banging and clanking, separately and collectively, each one at its own particular task; the dynamo, the circulating pump, the air fan, and so on, all jammed and crammed into the engine room below the water, the sure armor that makes shot and shell to ricochet, the stopping of any one of which by some small rod breaking or smaller pin coming out would, directly or indirectly, cause the speed of the ship to slacken, more or less, according to the relative importance of that particular engine. Above all these smaller noises is the labored pulsation of the main engines, with the massive crank heads swishing round at a rate seemingly quite disproportionate to their size, looking like a gigantic prizefighter hitting out unceasingly. The engineer above on the cylinder, taking diagram with nimble fingers, hears like a trained bandmaster, out of the thousand and one different noises, great and small, that a certain small engine is knocking out of tune, and goes down to see about it accordingly. Between the throbbing cylinders, crouching on the platform, are stokers, in their fearnought trousers and flannel shirts, fairly reveling grease and oil, squirting the latter here and there with long brass squirts, feeling a cross head for its heat, squirting oil again on the piston rod, then to work with a spanner where a leaky joint is announced by a hissing of steam at every stroke, and so round again. And they seem to like it.

Go and see boilers boiling. Open one of the air-locked doors, and close it before attempting to open the other, if you don't want to get blown away by the half-inch forced draft you will let loose. Now open the other and enter a regular pocket inferno. Oh, the awful heat of it! See those black devils, each a pair of white eyes and a dim outline, moving about in the uncertain light of a pitful slush lamp. One of them is providing himself with two long iron bars, surely furnished at the end with pincers and instruments of torture, as seen at the Campo-Santo of Pisa; opens a small door and thrusts them, in turn, into the mouth of a burning fiery furnace, to rake and pull about; surely the unrighteous are having a bad time of it. Another pair of eyes provides, with black arms, a bucketful of more coals of fire to be heaped on. Could the great chief stoker himself improve much on this fearful place, even for his own purposes?

From the other side of the stokehold a cry goes up, "How long?" to which reply comes, "Only ten minutes more;" and so you need not clean your fire till afterward. A few minutes later the engineer comes in and gives orders for working down. Everything has been tried in the balance and nothing has been found wanting. The main engines pulse slower. The foremost funnel ceases to rock. The seagulls in the wake of the ship ease down. The powers are informed. Three flags flutter to the mast-head. "The trial is satisfactory."—London Globe.

TRIBUTE TO MR. WEBB.

At the commencement exercises of the students of the W. H. Webb Academy and Home for Ship Builders in New York recently, Mr. Andrew H. Green delivered the following address on the philanthropic career of Mr. Webb:

"Born in the year in which Robert Fulton died, Mr. Webb's career was immeasurably more fruitful of great results. Fulton's reputation rests on his success in applying the borrowed idea of steam propulsion to water craft. Mr. Webb, however, brought to his work a highly trained scientific mind, capable of inventing new and radical ideas, and of carrying them into the most perfect physical expression. It is freely conceded that in his wonderful clipper ships he developed the ancient art of wooden ship building to the flower of perfection. In the construction of steamships, as of sailing vessels, he was also a leader, not a follower. We see him building the first steamship to run between New York and Savannah, the first large steamer for the New Orleans trade, the first steamer that entered the Golden Gate of the Pacific, the first steamers selected to carry the United States mails from New York to China and the first iron-clads ever built in this country, one of which was the first iron-clad to cross the ocean. In some respects he was ahead of the enlightened sentiment of his own country. When, fifty years ago, his fertile mind conceived the idea of building a model steam vessel of war for the United States navy, our government repelled him with such impossible conditions that he was forced to go to Europe to secure the recognition which his genius deserved. There, in Russia—semi-barbarous Russia, as we are apt to think of her—he obtained the order to build his famous seventy-two gun screw frigate, the General Admiral, which was the fastest vessel of war built up to that time. When, a few years later, stimulated by the unexampled success of the General Admiral, and possibly by the martial events of our civil war, he was ready for another progressive step, it was from the royal government of Italy that he received his orders for the first iron-clad ever built in America. His extraordinary iron-clad ram, the Dunderberg, the most formidable war vessel afloat, built originally for our own government, was permitted to be sold to France, because, the civil war being ended, it was supposed that the United States would have no future use for her.

"Toward his fellow craftsmen, who in their humble spheres have contributed so much to advance and perfect naval architecture, many of whom I see before me, Mr. Webb always entertained most kindly and fraternal relations. He delighted to call them his guests, and surely than this, the structure that his bounty provided for them, no more magnificent and hospitable mansion ever opened its doors of welcome. Mr. Webb's private character was also estimable. His intellectual attainments were the fruits of the hardest and most self-denying application. His rewards, not gathered by devious methods, but the result of great natural ability and honest work, were ample; they were carried without vanity or ostentation. His tastes were elevated, and he gratified them by surrounding himself with the choicest works of art. He was little ambitious to sit in high places, and put away the proffered honor of the mayoralty of this great city. His disposition was kindly and his instincts generous, as is signally evidenced by this noble institution, erected during his own lifetime. He was a conspicuous exemplar of civic virtue, and his personal honor was above reproach. Emperors conferred upon him their jewelled tokens, but that which adorned him most was the ornament of a lustrous character and a name which was respected by his contemporaries and which will be held in grateful memory."

The address was listened to with great interest, and the eulogistic tenor of the remarks by the venerable Mr. Green upon the life work of the famous ship builder were keenly appreciated by those present. The members of the graduating class at the academy this year were C. DeWitt Anderson, Philip B. Brill, Edward O. Cutler, Matthews E. Davis, C. Lee Morrison, Clifton Yeomans, John F. Friebele, Eugene T. Lake, L. D. Norseworthy, Mason H. Sheffield, Howard C. Towle, and Harry Stuart New.

REPORT ON THE KEARSARGE'S TURRETS.

The report of the naval inspection board upon the final two-days' sea trial of the Kearsarge leaves the question of the superimposed turrets still open. In the report the board says:

"The four guns in the forward turret were fired simultaneously at 4,000 yards range, and three of the projectiles apparently fell in the same place. One feel about 300 yards behind, but in a line. The four guns of the after turret also were fired simultaneously, and in this case three of the projectiles apparently fell in the same place. One 8-inch projectile fell to the right. During the tests the blast from the 8-inch guns in the superimposed turrets did not inconvenience the people in the thirteen-inch turret."

The automatic one-pounders in the military tops, when fired, vibrated and jumped so as to make further firing dangerous. They will be replaced with lighter guns. The board found no defects in hull or machinery of the Kearsarge.

IMPROVEMENT IN SCREW PROPULSION.

By I. McKim Chase.

While improvements in the hulls and motive machinery of steamships have progressed with rapid strides during the last decade, it is somewhat surprising that so little advancement has been made in the improvement of one of the most important factors in the problem of marine propulsion, namely, the propelling instrument.

Sir William White, referring to the subject of propellers, says: "The choice of the most efficient propeller has always been a matter of difficulty, and the solution of the problem has in many instances involved extensive experimental trials. By means of alterations in propellers alone a very large increase in speed has been effected, and even now there are difficulties to be faced."

It is true that patents are occasionally granted for improvements in screw propellers, but they usually relate to some peculiar configuration, and show little departure from well known forms. Aside from the dimensions and revolutions of a screw, the best form of which is governed by the type of vessel and the duty it will be called upon to perform, thus are two cardinal principles to be kept in view when improvements in screw propulsion are sought, namely, that it is the reaction of pressure resulting from the movement of the mass of water acted on by the propeller, and that it is the resistance which this mass opposes to being moved by the propeller from a state of rest, or, in other words, change of motion, that produces the "thrust" that drives the ship.

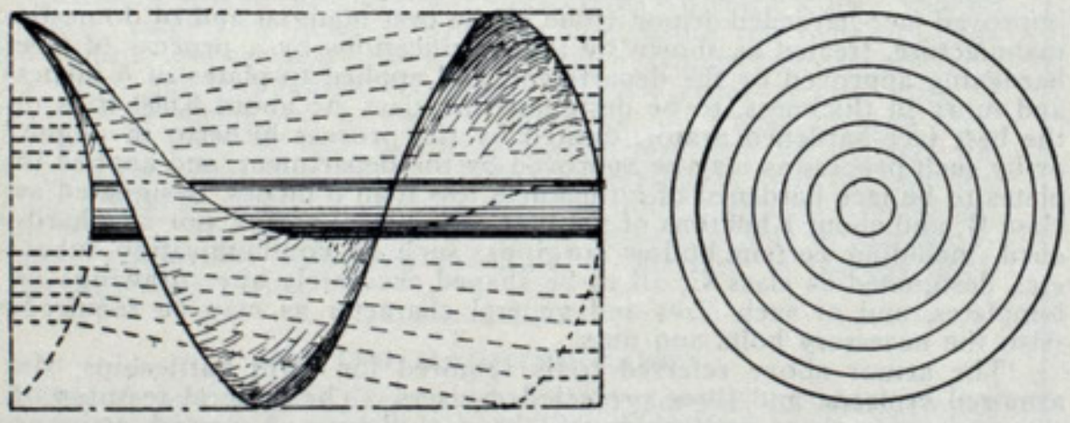
It is very important to provide for the freest access of water supply to the forward or advancing end of the screw, and also to have the screw well immersed and prevent air being worked in. The longer the time a screw acts upon the water which passes through it, the greater the tendency of the latter to diverge from the axis of the screw and also to acquire a rotary motion with the screw. For this reason, very long screws prove inefficient. Fig. 1 illustrates a screw designed to counteract the centrifugal action and the divergent tendency of the water discharged; but such screws have proved no more efficient than others not so designed.

Experience with propeller pumps first proved the foregoing and also demonstrated that if a long screw be divided into several short ones and arranged on a shaft with sufficient space between them to allow the water acted on by the first or advancing screw to recover somewhat from the rotary motion imparted to it before meeting with the screw following, superior results were accomplished. This principle has been adopted in applying screws to the Turbinia and Viper, and it is doubtless owing to this in great measure that their phenomenal speeds have been attained.

Fig. 2 illustrates a right screw of one convolution of the thread; it shows the streams into which the column is supposed to be divided, diminishing in area as their velocity is accelerated towards the discharging end. It also shows the divergence of the streams and their tendency to escape tangentially by the action of the screw.

When a screw has a high rate of rotation the blades, together with the bracket in front, may seriously interfere with the supply-water entering the screw. In such a case, the water being discharged with greater velocity than that at which it enters, obviously the screw cannot be completely filled with water; there must of necessity exist a vacuous space increasing towards the discharging end which is occupied by attenuated water or spray. This condition may reach such a state that the expenditure of energy is far in excess of the relative progress made and the power absorbed wholly out of proportion to the results attained. This has had practical demonstration in the trials of high-speed boats, and also in model experiments. The term "cavitation" of the screw has been coined to denote these extreme cases. Its preventative would seem to be fewer blades and more supply-water.

Fig. 1.

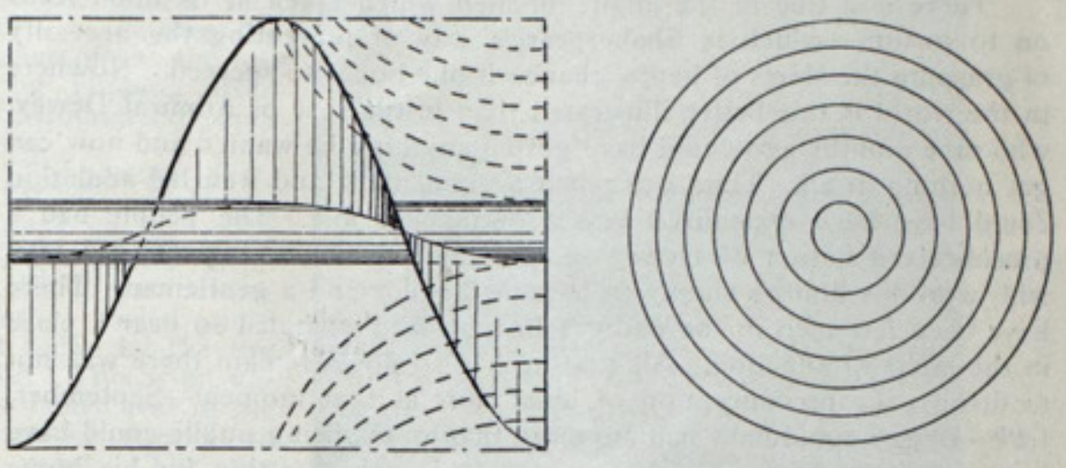


There are two directions in which investigation with the object of increasing the efficiency of screw propellers might prove of profit. The first would be to make the screw deal with more water, which would involve removing the bracket from its usual position in front of to the rear of the screw. There is little doubt that the bracket bearing as usually situated in front seriously interferes with the supply-water. The bearing in this position, however, has the merit of convenience in shipping and unshipping the screw, but this occurs so seldom in the lifetime of a vessel that it is doubtful whether it compensates for the loss in propulsion that the position entails.

The other direction in which improvement is possible is to utilize the energy that now is dissipated in the water discharged by a screw, and have it aid in producing thrust. To illustrate the amount of energy which now goes to waste in the water discharged by a screw, assume a screw appended to a vessel, of 5 feet diameter, making 300 revolutions per minute, to have 20 per cent slip and to advance 6 feet per second; further assume it to have an adequate supply of sea-water. There will be discharged in one minute about 1,200 foot-tons, which, reduced to its equivalent in coal, will amount to about four and one-half tons per hour. If one-fourth of this amount can be so directed as to aid in producing thrust, a substantial improvement in screw propulsion will obviously be secured. The most advantageous way to accomplish this is to have the water discharged by a screw impinge upon blades suitably constructed and fixed to the vessel. This would produce a reactionary effect, the resultant of which will be in the direction of the motion of the vessel, and reverse the principle of the turbine, the deflecting plates of which, interposed between the wheel and the supply-water, increase their efficiency by producing an impulse as well as a reactionary effect upon the blades of the wheel.

Guide blades in combination with a screw propeller were first employed by Mr. Rigg of England. At the time of their introduction nearly all steam vessels, especially those navigating the seas, were provided with full sail power. Steam was an auxiliary power only employed to propel vessels in combination with sails, and when, as was often the case, its employment was not advantageous, sail power alone was used. Under such circumstances the initial application of guide blades did not meet with much favor. At the present period, however, the conditions are reversed, and steam power is considered auxiliary only in a few exceptional cases, naval vessels being entirely devoid of sails. Later Mr. Thornycroft has successfully applied guide blades to his turbine propeller, but their best application for larger vessels has yet to be devised. Judging from their appearance, some have formed the erroneous opinion that guide blades will prove an obstruction, but if the blades are properly designed and applied, it is only when the screw is idle and the vessel advancing that such would be the case, and even then they would cause but little more obstruction than does the screw itself when not rotating.

Fig. 2.



SUPERIMPOSED TURRET QUESTION STILL OPEN.

Secretary Long has decided to refer the question of the adoption of superimposed turrets for the battleships Pennsylvania, New Jersey and Georgia back to the board of construction, whose membership will be increased for the purpose of considering the matter by half a dozen officers of high rank. The new members will probably be Rear Admirals Rodgers and Barker and Capts. Taylor, Chadwick, Converse and Brownson. Secretary Long agrees with the contention of Rear Admiral Bradford, the minority member of the board of construction, in this instance, that the question of the adoption of superimposed or ordinary turrets for the three battleships is tactical rather than one of construction, and it was for that reason that he has decided to designate six other officers to act with the construction board. The board will be called on also to determine whether superimposed or ordinary turrets shall be placed on the two battleships authorized by congress at the session just ended. The superimposed turret is seemingly put at a disadvantage by the action of the secretary. Four of the five members of the construction board signed the report favoring ordinary turrets, Admiral Bradford being the only member who favored the new type. Thus four of the eleven members of the committee are already committed on the subject. Rear Admiral Melville, however, agreed to the battery arrangement adopted by the board only after he realized that the majority of the members were hostile to the superimposed turret. He has not abandoned his belief in the superiority of the superimposed type, and it is not unlikely that he will advocate it at the sessions of the committee.

NANSEN'S NEW SURVEY VESSEL.

From an article in the Glasgow Herald recently, it is learned that Dr. Nansen is not going into Arctic exploration, but is engaged along with Professor Johan Hjort of Christiania university in deep sea investigations off the coast of Norway. A specially-equipped vessel has been built for the purpose from the designs and specifications of Mr. George M'Farlane, naval architect, Glasgow. The vessel was built at the Fredrikstads Works, Fredrikstad, Norway. The dimensions are as follows: Length between perpendiculars, 122 feet; breadth, extreme, 22 feet 3 inches; depth, molded, 11 feet 9 inches; load draught with bar keel (mean) 9 feet; deadweight, all told, at 9 feet draught, 125 tons; capacity of coal bunkers, about 70 tons. The vessel and machinery were constructed under special survey and classed 100 A1 in Lloyd's registry. On a mean draught of 9 feet the vessel attained a mean speed of 10 knots on a continuous run of six hours' duration. She is built of mild steel, in conformity with the requirements of Lloyd's, and the scantlings of steel and iron work are in accordance with Lloyd's regulations. The deck erections are built of steel and securely attached to the deck, so that the vessel may be able to keep at sea in all weathers. She is fitted with a Lord Kelvin's (Sir William Thomson) standard compass. The engines are of the direct-acting, inverted-cylinder, triple-compound three-crank type, fitted with surface-condenser, and have Lloyd's M. C. The cylinders are 11, 17 and 27 inches diameter, by 21 inches stroke. The boiler is cylindrical, 10 feet 6 inches inside diameter and 10 feet long. It has two of Morison's patent furnaces, 3 feet diameter, with separate combustion chambers, and works at a pressure of 180 pounds to the square inch.

In honor of the Master Mechanics' and Master Car Builders' convention in Saratoga the Railway Review has issued a special number. It is the finest special number of a railway paper that has ever been brought to the attention of the Review. The portrait of J. H. McConnell, president of the Master Mechanics' Association, is superb, and the hundreds of pictures published make it a veritable photograph album. It will doubtless be kept as a work of reference for years to come.

MARINE REVIEW

Devoted to the Merchant Marine, the Navy, Ship Building, and Kindred Interests.

Published every Thursday at No. 418-19 Perry-Payne building, Cleveland, Ohio, by THE MARINE REVIEW PUBLISHING CO.

SUBSCRIPTION—$3.00 per year in advance; foreign, including postage, $4.50, or 19 shillings. Single copies 10 cents each. Convenient binders sent, post paid, $1.00. Advertising rates on application.

Entered at Cleveland Post Office as Second-class Mail Matter.

There is a tide in the affairs of men which taken at its flood leads on to fortune—which is Shakespeare's way of presenting the necessity of grasping the skirts of happy chance if one hopes to succeed. Nowhere in the world is this better illustrated than in the case of Admiral Dewey, who nine months ago could have gotten anything he wanted and now can get nothing at all. Time was when a momentary and frenzied adulation could have been crystalized into a permanent gift. The people had a preconceived notion of Dewey—a grim and silent and capable old man who wore his honors simply as became a sailor and a gentleman. There have been few men in the nation's history who occupied so dear a place in the niche of affection. All that he had to do to remain there was not to disturb the preconception of him. For at that moment—September, 1899—Dewey could have had anything that an admiring public could have bestowed upon him. No person ever had such a setting for his home coming. Cæsar could not have had it because science offered no contribution; Dewey was surrounded by the spectacular display of nineteenth-century invention. Had he at that time become a receptive candidate for the presidency of the United States nothing could have stayed his progress—nothing except Dewey himself. The widespread dissatisfaction of the people over the vacillation of McKinley and the incendiarism of Bryan would have lent itself to his canvass. But, alas, the admiral was destined to shatter his own boom. There is no need to recount here the causes which led to his undoing. All that was the matter with him was thirty years upon the water. There was something childlike and simple in his announcement of his candidacy. The presidential office is not a difficult one to fill and therefore I can fill it. There is something exquisitely naive in his letter of withdrawal:

"Some time ago the leaders, or those whom we have always regarded as leaders, asked me if I would allow my name to be used in connection with the presidency. After thinking this proposition over for several weeks I said 'Yes,' and accordingly announced that if the people wanted me to serve in that capacity I would gladly do so. But I thank God that they do not appear to want me."

And thus the admiral of the navy gets into politics and then gets out again. At any rate it served to add a dash of the picturesque to an otherwise bald and unattractive campaign.

There may be work for the navy department to do yet in that place where, as Kipling says, the dawn comes up like thunder. If China is to be partitioned the United States will have a slice. One must look at the situation frankly—the prize is far too great to close one's eyes to. The orient is the market of the future. It contains nearly 400,000,000 people with wants. As a surplus consumer it is insatiable. The United States has today the greatest army and the most effective navy in the orient. The Philippines are only 600 miles from Hong Kong. The United States is already at the gateway of the Chinese empire. Whether it is well or no is no longer the question. We are there. Not poppy nor mandragora nor all the drowsy syrups of the east can lure us back to that sweet isolation which we owned yesterday. There are 50,000 United States troops in the Philippines, an abundance of transports, battleships and cruisers and the only gunboats of any navy that can navigate the waters of the Yang Ste Kiang river. The situation in China is one of the most delicate that has in recent years been presented to a concert of nations. It would not be surprising if mischief came out of it. There is bad blood among the foreign troops. The United States does not desire to see the dismemberment of the Chinese empire—that great loose-jointed mass which never had a semblance of cohesion in its several states; but it is irrevocably pledged to the maintenance of the open door. Its people would consent to no other policy. No nation shall have an advantage there in the pursuit of trade save such as nature has given to it. The United States navy, more than any other force, would put the quietus upon any other policy.

Now that that time-honored custom of congress, more honored in the breach than the observance, of wrangling over the price of armor plate has been disposed of for a while, the navy department has issued its circular calling for bids. Briefly the circular calls for 31,000 tons of Krupp armor, 3,600 tons of Harveyized armor and 1,150 tons of nickel steel armor, not hardened. The division of the armor into three classes is for the purpose of saving a little money. Hitherto it has not been necessary to classify armor. Now that things may progress until next December it is well to inquire what congress has accomplished by all its noise. All that it has done is to delay the construction of nine battleships and three armored cruisers. Nay, for over a year it has prohibited their construction. The battleships Alabama, Illinois and Wisconsin, authorized in 1896, should have been completed in the summer of 1899. Indeed they were ready for launching in 1898 and would have been launched had there not been the absurd reservation of $300 per ton in the armor clause. The war caused congress to lift its embargo of price, but armor plate is a commodity which cannot be made in a day. Had these three battleships been needed, as they doubtless would have been needed were the United States fighting with any power except decrepit Spain, we could not have had them. These three battleships have been delayed eighteen months, the Maine, Missouri and Ohio have been delayed twelve months and the vessels of the Georgia and California class have been delayed nearly a year.

To move or not to move the Port Royal naval station is the problem which is now agitating the navy department and likewise the inhabitants of Port Royal. The Port Royalites have just issued a circular against the removal of the dock which reads like a real estate agent's description of a place that he has to sell. The circular says that the harbor of Port Royal is the best on the South Atlantic coast and that it is spacious enough to permit the navy of the nation to enter in double column to maneuver and to find ample and protected anchorage; the dry dock is the best timber dock the government owns; the plant is complete and the place is healthy. Investigation, however, does not support the statement of the people of Port Royal. The site of the Port Royal station was selected by Secretary Tracy. After many vexatious delays the timber dock was opened in 1895, having cost $449,437.09. Since that time $25,430.72 has been expended in repairs upon it. Accident after accident has happened to the dock, beginning with an upheaval of the bottom, then dislocation of the abutments, followed by the bursting in of the altars until today it is with fear and trembling that the department docks its lighter ships in it. It has been recommended by the bureau of yards and docks that the dock be replaced by a stone and concrete one at a cost of $500,000. Admiral Endicott also reports that the channel is tortuous and of insufficient depth and that the supply of drinking water has to be carried in boats to the station. Surely if the question of site is an issue now is the time to settle it. Charleston is the foremost candidate for the station.

THIRTY-FIVE THOUSAND TONS OF ARMOR.

The circular of the bureau of ordnance, navy department, calling for proposals for supplying armor requires bids to be submitted by Aug. 10 next. The competition is limited to domestic manufacturers of steel. The gist of the circular is as follows:

Bids are invited for supplying about 31,000 tons, more or less, of improved face-hardened armor, to be of the best material and of domestic manufacture, treated as shown by the specifications by a process of face hardening approved by the department, and applied to plates of 5 inches and more in thickness, to be designated as class A; about 3,600 tons of the best face-hardened armor, treated by the process hitherto in vogue, or by such process as may be approved by the department, and applied to plates to be face hardened of a thickness less than 5 inches, designated as class B; and about 1,150 tons of the best nickel-steel armor, not face hardened, including certain hollow forgings, such as communication tubes, etc., designated as class C; all to be shaped accurately after drawings or templates, and of such sizes and general character as may be required. Also the necessary bolts and nuts.

The armor above referred to is required for eight battleships, six armored cruisers, and three protected cruisers. The general features of the armor for three battleships will be as follows: A partial main or water-line belt, 7 feet 6 inches in width, having a maximum thickness of 11 inches at the upper edge, tapering to 7½ inches at the bottom for a distance of about 190 feet, then reducing gradually to 4 inches at the bow; upper and lower casemate armor, each 7 feet 6 inches in width and 6 inches in thickness, protecting the vessels' sides above the main belt and connected at the ends by diagonal casemate armor 6 inches in thickness; two barbettes for the turrets, 12 and 8 inches in thickness; two turrets with 12-inch port plates and 11-inch side and rear plates, conning tower 10 inches, and signal tower 6 inches in thickness, in all about 2,480 tons for each vessel. The general features of the armor required for the other five battleships will be similar in character to that described above, the quantity per ship being somewhat greater, however, but presenting no greater difficulties of manufacture. Six armored cruisers, each armored generally as follows: A main or water-line belt about 250 feet long, 7 feet 6 inches wide, and 6 to 5 inches in thickness; a taper belt about 250 feet in length, 7 feet 6 inches wide, 3½ inches in thickness; upper and lower casemate armor about 232 feet in length and 5 inches in thickness; transverse casemate armor, 4 inches in thickness; 6-inch gun protection, 5 inches in thickness; conning tower, 9 inches in thickness; signal tower, 5 inches thick; two 8-inch gun turrets, 6½ inches in thickness; two 8-inch barbettes for turrets, 6 inches in thickness; armor tubes and the necessary armor bolts and nuts. The armor for three protected cruisers will consist of comparatively thin armor for gun protection, conning towers, communication tubes, etc. All the foregoing armor plates are of usual shapes and dimensions, presenting no unusual difficulties of manufacture.

Deliveries of the above armor must commence as soon as practicable after contract is awarded, and shall continue thereafter at a rate of not less than 300 tons per month, the first deliveries to consist of the armor of the first described battleships in the order given in the schedule accompanying the specifications, and later deliveries as determined by the department.

IMMENSE FLOATING DOCK AT SOUTH BROOKLYN.

The construction of an immense floating dry dock by the Morse Dry Dock & Iron Works Co. at South Brooklyn will put an end to the difficulties that have been encountered by the very large transatlantic liners in securing proper dry dock facilities in New York harbor. The Morse property where an extensive and thoroughly up-to-date repair plant is under construction, is situated between Fifty-fifth and Fifty-eighth streets and back on Fifth avenue, along which it extends for a distance of 426 feet. In addition to floating dry docks there will be a wet dock or basin, the inner end of which will be about 100 yards from First avenue, while the two piers which enclose it will extend out 1,400 feet to the edge of the new government 40-foot channel. The first 700 feet of the basin will be about 37 feet wide with a depth of 25 feet, and here vessels with a moderate draught of water will be berthed in the proximity of the machine shop. The outer 700 feet of the channel will be 100 feet wide, and will have a clear depth of 35 feet, or sufficient to accommodate the largest ocean liners. The pier to the south will be 22 feet in width, and that to the north 30 feet in width. On the north side of the latter pier will be the dry dock basin, which will have a clear width of 130 feet and a depth of water at the entrance of 35 feet, while the length of this basin will be just 1,000 feet. The pier on the north side of this basin will also be 30 feet in width. The frontage of all three piers will aggregate 4,000 feet, and each pier will be traversed by a railroad which will run through the repair and boiler shops, and also have connection with other points in the yard. At about the midlength of the southerly pier there will be a large coal pocket for the accommodation of the ships which visit the basin. Immediately to the east of the dry dock basin will be a boiler shop, and beyond this a large two-story machine and repair shop, the width of each of these buildings being 80 feet, and their combined length 600 feet.

The object of most popular interest is naturally the large pontoon dry dock. This huge structure is not built, as might be supposed, as one integral structure, continuous throughout, but is composed of seven separate sections, which are identical in every respect. Each section is built of an approximate U-form. The body of the pontoon is 120 feet wide, with a maximum depth of 15½ feet at the center. On each side are two tall wings, each measuring 56 feet from the bottom of the pontoon to the top platform, on which are located the motors for operating the electric pumps and handwheels for opening and closing the inlet valves. Each section is 80 feet in length, and, as there is a 36-foot extension of the floor of the two end sections, and a space of about 4 feet is allowed between the adjoining section, it will be seen that the total overall length of the dock is approximately 700 feet. The dock is built of southern pine, and a very complete system of stiffening bulkheads is used, there being seven running longitudinally, or fore-and-aft through each pontoon. Each section is provided with a number of inlet gates below the water line, and it carries sufficient ballast to insure its sinking when the gates are opened.

On the floor of each wing are located two centrifugal pumps, each pair driven by a 50-horse power electrical motor, which is located on the working platform above. These pumps have a capacity of between 5,000 and 6,000 gallons of water per minute, and it is expected that they will be capable of lifting a ship in from 30 to 45 minutes. The lifting capacity of each pontoon is 2,500 tons; consequently the combined lifting capacity of the whole dock, when coupled up, will be 17,500 tons. The repair buildings will contain the blacksmith shop, boiler shop, machine shop, and various other departments required in a modern plant of this kind. The machinery will be in every way up to date. Electric power will be extensively employed, most of the machines being run by direct-connected motors, and extensive use will be made of compressed air, not only in the shop, but throughout the yard. For the latter service lines of compressed-air mains will be carried down the full length of each pier, with valves at every 75 feet, to which flexible hose can be attached for work upon the ships themselves. This compressed air will be used for caulking, riveting, chipping, drilling, and the other operations incidental to ship repairs. The company estimates that it will be able to accommodate about twenty-five ships, big and little, at one time in the dry dock and the adjoining basins.

TOWING MACHINE CASE.

A patent case that has excited considerable interest in vessel circles in the great lakes was decided in the United States circuit court at Cleveland a few days ago. The opinion was by Judge Clark. Towing machines of the Shaw & Spiegle type, manufactured by the American Ship Windlass Co. of Providence, R. I., have had much to do with development of large steel tow barges on the lakes. It would very probably never have been possible to tow the 8,000-ton steel barges now in the ore, coal and grain trades but for the use of these machines in handling wire tow lines. The Chase Machine Co. of Cleveland began making a towing device after the Shaw & Spiegle machine had been used on a large number of vessels. They took out patents in June, 1896. The Shaw & Spiegle patents, owned by the Boston Tow Boat Co., had been taken out in June, 1888. The Boston Tow Boat Co. claimed that the Chase patents were an infringement and brought suit for an injunction and damages. The court held that the Chase patents did not infringe and dismissed the suit. The case will probably be appealed.

The manufacture of chains for such special purposes as iron mining and dredging has had particular attention from one large concern in this country, the Newhall Chain, Forge & Iron Co., which has headquarters in the Havemeyer building, New York. This company makes all chain from its own iron. High class yacht and ship cables are a specialty and they are tested to admiralty standard with proof certificate furnished; testing machine licensed by Lloyds. The company's product includes also hand made crane, quarry, mining, rafting, toggle-log, haul-up and conveyor chains, as well as the standard Warwick dredge and steam-shovel chains.

The Nickel Plate road will sell excursion tickets to Kansas City, Mo., account national democratic convention on July 1, 2 and 3, at one fare for the round trip, tickets good returning to and including July 9. Write, wire, 'phone or call on nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O. 109, June 28.

SUCCESSFUL WRECKING JOB.

The Scottish King, a large ocean-going steamer, while on a voyage from Antwerp to Boston, ran ashore in a fog on Sept. 30, 1898, at Seal Cove on the east shore of Newfoundland and twelve miles distant from Cape Race. The accompanying photograph of the vessel was taken about a month ago by Capt. Bernier, the commander of the Canadian wrecking steamer Petrel. Last week the Petrel succeeded in getting the steamer off, as the following clipping from a Newfoundland paper shows:

"The steamer Scottish King, which was stranded on the rocks near Seal Cove, Sept. 30, 1898, was triumphantly towed into port today by the tug Petrel. This is an unprecedented feat in the history of wrecks on our coast. The tug with the derelict in tow left Fermeuse last night, and as they steamed out of the harbor guns fired, tar barrels made a fine bonfire and flags were displayed everywhere. Both vessels had a nice run down the shore. Mr. Hansen of the Petrel had charge of the Scottish King, Mr. Turnbull looking after the pumps. A crew of twenty-five men from Fermeuse are on board and worked the ship down. Before leaving Nos. 1, 2 and 3 engine rooms were pumped dry, and No. 4 aft was raised by means of compressed air. Mr. Leslie, manager of the Collings Bay Rafting & Forwarding Co. of Kingston, Ont., is proud of his achievement, and with him is Capt. Bernier as nautical adviser. The vessel, now lying at the dock pier, has been visited by hundreds, and as she was brought into port the shrill whistles of all the ships sounded and the Bernicia hoisted the signal 'Welcome.'"

AROUND THE GREAT LAKES.

Capt. John C. Sterling, a well known vessel master, died at his home in Marine City at the age of forty-two years Monday.

The McMorran Wrecking Co. of Port Huron has succeeded in raising the schooner Thos. L. Howland, sunk several weeks ago by the ice off Windmill point, Lake Erie.

Two new clam shell hoists are being installed in the Philadelphia & Reading coal dock at South Chicago. They will have a capacity of about 1,000 tons daily and will make the dock able to unload from boats 2,500 tons in a working day.

The new steel steamer Strathcona of the Hamilton & Fort William Navigation Co. (R. O. & A. B. McKay of Hamilton, Ont.), is now on her way to the lakes from England. The Strathcona and her sister vessel, the Winona, are 255 feet long, 42½ feet beam and 23 feet 8 inches deep.

Coal business of the Cleveland, Lorain & Wheeling Ry. has been taken over by the Lorain Coal & Dock Co., Western Reserve building, Cleveland. Officers of the company are: President, Arnold C. Saunders; vice-president and treasurer, Harold B. Nye; general manager, Edward Johnson. This means that coal affairs on the docks at Lorain, as well as the handling of Cleveland, Lorain & Wheeling coal, will be directed from the office of A. C. Saunders & Co., Cleveland.

The passenger service of the Manitou Steamship Co., Chicago, was inaugurated on Thursday of this week by the departure of the Manitou from Chicago to Mackinac island. During the season a tri-weekly schedule will be observed. The announcement of Joseph Berolzheim, the general passenger agent, shows that the passenger accommodations have been greatly enlarged and improved and that connections are made at Mackinaw island with all eastern and Lake Superior steamers for Detroit, Cleveland, Buffalo, Marquette, Duluth, Canadian and Lake Superior points.

Lewis Nixon, of the Crescent ship yard, Elizabethport, who, as president of the new East river bridge commission, made a trip to Europe for observation purposes and returned on the American liner St. Louis recently, is quoted in an interview as saying: "Another object of my trip was to see the English and Continental battleships of approved make. None of them, so far as I could judge, surpassed, or even equaled, our best ones. Among English naval men, and especially in the admiralty office, more interest is taken at present in the submarine boat than in anything else. It is talked of on all sides, although the officials declare that the British government is not planning to build any. The general opinion seems to be that the Holland design is the only promising one yet invented."

"A MANUAL OF NAVAL ARCHITECTURE," by Sir Wm. H. White, director of naval construction in England, is one of the best-known books of its kind in the world. A fifth edition, revised and largely rewritten, is just out. It is a text book for students of naval architecture. Price $9. The Marine Review Publishing Co., Perry-Payne building, Cleveland.

It is reported that the Dominion Atlantic Railway is negotiating for the purchase of the Yarmouth line of steamships, the price being about $1,000,000. Both companies are now running independent boats.

IRON ORE SUPPLY FOR ENGLAND.

A PRESSING QUESTION WITH THE IRON MASTERS—A REVIEW OF THE SITUATION FROM ONE OF THE LONDON TRADE JOURNALS.

The movement which is growing among English iron masters for the acquisition of ore supplies in Spain is a departure of considerable significance. The steady increase in the past few years in our imports of Spanish ore means clearly that our own reserves are not equal to trade requirements, and as we do not anticipate giving up iron and steel manufacture in the years to come, in spite of the competition of foreign countries, the question of acquiring regular and adequate sources of supply from abroad is becoming pressing. Iron ore is found in many parts of the world, but the deposits of more immediate concern to this country are those which are readily accessible. On the continent there are two countries at least which are capable of helping out our demand for foreign ores of good quality—Spain and Sweden. On the first of these we draw pretty considerably already, the United Kingdom accounting for 6,224,200 tons in 1899, out of a total export of 8,613,100 tons. In the future we are likely to import more. In Spain there is an inexhaustible quantity waiting to be mined, not only in the country behind Bilbao, but in other provinces where the ore-bearing lands have as yet been scarcely scratched. The Spaniards can work very few of them to the best advantage, owing to lack of enterprise and native capital, and inability to overcome obstacles which are in reality slight though apparently great. Take the Alquife mines in Almeria, which have recently been acquired by a group of English ironmasters, including the Millom and Askam Hematite and the Coltness iron companies. These mines have been worked spasmodically and primitively for some hundreds of years; but careful estimates show that the amount of ore in the explored portion alone ranges from 6,000,000 to 10,000,000 tons. "At the limits of exploration," it is stated, "the veins disappear without any contraction, making it all but certain that this quantity represents only a fraction of the available ore in the deposit." Transportation facilities were formerly lacking, but now a railway has been constructed to Almeria, from which port freights are cheaper than from Bilbao. For the property as it stands, the group of English ironmasters has paid £450,000, of which two-thirds have gone to the vendors, while the balance is to provide working capital for the mines to increase the shipping facilities, and to furnish wharves and rolling stock. The Alquife ore is described as "remarkably uniform and pure, more than self-fluxing, and does not require any limestone in the blast furnace." The Coltness company has secured an interest in another mine besides the Alquife. This is the Bacares, situated in the same neighborhood, which, however, has only been leased. There are plenty of other good properties up and down the mining districts of Spain whose acquisition by English companies would furnish for many generations a plentiful supply of rich ore at a low cost, and would make them in a large measure independent of market fluctuations. We have no space, nor are we really called upon to enumerate particular mines—a would-be purchaser would find no difficulty in the choice of a mine of unquestioned value. But it may be permitted to us to point out that the province of Asturias possesses some very extensive deposits within very easy reach of the sea at Gijon, to which port there is already railway communication. It has been said that this field has every probability of yielding a large output over a long series of years, and by reason of the increasing scarcity of high grade ores for the manufacture of best steel, attention may be drawn to its existence. We believe shipments are to be made shortly from this district. The ore is mostly hematite, averaging 60 per cent. of iron, and practically free from phosphorus and sulphur.

The present output of iron ore in Sweden is about 2,500,000 tons per annum, and the better part of it is manufactured or partly manufactured in the country itself. Last year, for example, there were produced 492,700 tons of pig iron, 195,300 tons of bloom iron, 91,800 tons of Bessemer ingots, and 171,900 tons of Martin ingots. The hopes of English consumers for ore to supplement their own supplies rest upon the development of the great deposits in the extreme north of Sweden. A railway is now under construction from Gellivara to Victoriahavn, on the Ofotenfiord—opening out into the Atlantic—which will make the ore of Luossavaara and Kiirunavaara readily available for shipment to the United Kingdom, to Germany, and to Belgium. It will be two years before this line is built right through, and it is estimated that, in the year of opening, at least 2,000,000 tons will be exported. The railway is a continuation of the line from Lulea to Gellivara, and has now been extended to Luossavaara. The output of the mines is said to have been sold for several years ahead, and parcels have been disposed of for still later delivery. German and other users are in the field for this ore; one German smelting syndicate is credited with having made a contract for 900,000 tons yearly up to 1905, and some Belgian contracts even cover the years 1910 and 1912. We cannot vouch for the literal accuracy of these dates, but that big contracts have been made is beyond a doubt, and those English iron founders who are looking round for ore in the future might easily do worse than pay attention to this new source. Though the existence of an almost unbroken outcrop of magnetic ore on the heights of Kiirunavaara and Luossavaara has been known for a long time, no vigorous attempt has ever been made to work it. The country is unattractive, and there have been no easy and economical means of access with any consuming center.

It was only after very lengthy and persistent representations as to the importance of this source of national wealth lying undeveloped, that the Swedish government consented to provide a railway at all. Beyond the mineral, there is not likely to be much traffic between the mines and the Norwegian seaboard, but with ore alone the line should pay for construction, and a considerable mining population will be induced by the establishment of the industry. Directly and indirectly, the country must benefit very materially. Exhaustive investigations have shown beyond all doubt that unlimited quantities of ore are contained in the neighborhood. In the Kiirunavaara range there is a stretch of something like three miles running from 100 feet to 800 feet in width, and estimated to contain 215,000,000 tons. The Luossavaara range is not so extensive, the length of the ore body there being a little over 4,000 feet, and the quantity of ore 18,000,000 tons. These totals are those available above the level of Lake Luossajarvi. It seems probable that there is a large quantity of iron below the level of the lake, but 233,000,000 tons are enough to go on with. About a couple of hundred test pits have been sunk, and the average yield of samples taken from them gives 67 per cent. of iron. An elaborate technical account of the district has been given by Mr. Hjalmar Lundbohm, who conducted the exploratory observations for the Swedish government, and it is probable that some readers have made acquaintance with that account. We have reproduced a few of the more salient facts for the benefit of those who have not read Mr. Lundbohm's report, and in order to afford a clear idea of the quantity of ore which will be available for European manufacturers as soon as the railway is completed. Freights can scarcely be high, and the cost of production and of transport to the seaboard is not likely to prove a hardship. Even though no more than 1,500,000 or 2,000,000 tons on an average be raised annually, as seems to be the intention of those responsible, we shall still have a respectable addition to the ever-growing quantity required by ironmasters, in and out of Sweden.—The Engineer, London.

PURCHASE OF THE WEST INDIA & PACIFIC STEAMSHIP CO.

In April last a circular was sent to the stockholders of Frederick Leyland & Co. giving particulars of a new company which was to be formed to acquire the whole or a majority of the shares of the Atlantic Transport Co., the controlling interest in the National Steamship Co., and certain shares of the Wilsons & Furness-Leyland Line, Ltd., not already owned by Frederick Leyland & Co., Ltd., and the proposed capital of the new company was to be £4,700,000. This arrangement, however, fell through and the agreement was cancelled. But the purchase of the West India & Pacific Steamship Co.'s business by Frederick Leyland & Co. has been completed and last week the circular was issued to the shareholders. The circular says:

"For some considerable time past negotiations have been proceeding between this company and the West India and Pacific Steamship Co., Ltd., for the purchase of that company's business, and a conditional agreement has now been entered into with that company, subject to the confirmation of its shareholders. This agreement has received the approval of the first of the two meetings necessary for its confirmation.

"The combined net profits of the two businesses for the year ending Dec. 31, 1896, amounted to £194,125; for 1897, £233,518; 1898, £281,314; for the fifteen months of Frederick Leyland & Co., Ltd., to March 31, 1900, and twelve months of the West India and Pacific Steamship Co., Ltd., to Dec. 31, 1899, £366,122; and your board is entirely satisfied that the purchase has been made on advantageous terms.

"During the past five years steamers of the value of upwards of £1,250,000 have been added to the fleets, and as these steamers have from time to time come into effective operation in their various trades, the earning capacity of the business has largely increased. As against the capitalization of £3,150,000 (including the debentures), it is estimated that the net assets of the two businesses on completion, and the benefit of the companies' interest in steamers building at prices below those now ruling, will amount approximately to £3,000,000, apart altogether from the goodwill of the businesses. The reconstruction of the company will be proceeded with on a different basis to that originally proposed, and will be direct with the new company. It is proposed that the new company shall be styled 'Frederick Leyland & Co. (1900), Limited,' and that the capital shall be £2,800,000."

EARNINGS OF THE CUNARD STEAMSHIP CO.

The report of the Cunard Steamship Co. for the year 1899 shows net earnings of £293,133, against £260,000 in 1898. The company paid 5 per cent. in dividends, against 3½; set aside £173,000 for depreciation and £34,248 for insurance. The balance sheet Dec. 31, 1899, shows:

ASSETS.

Steamships, outfits, etc.	£1,727,466
Real estate, wharf property, etc.	162,732
Movable plants, machinery, stores and coal	54,551
Ships pending voyage	31,892
Freights forwarding and other charges outstanding	26,073
Sundry debtors	154,017
Investments	4,989
Cash at banks	58,564
Total	£2,220,284

LIABILITIES.

Capital stock	£1,600,000
Reserves	371,341
Sundry creditors	165,416
Profit and loss balance	83,527
Total	£2,220,284

COL. LYDECKER ON SAULT RIVER IMPROVEMENTS.

Col. G. J. Lydecker, United States engineer, Detroit, has submitted to the war department his report on the preliminary survey for improvements in the Sault river. The document is now in the hands of Lieut. Col. McKenzie of Gen. Wilson's staff. It will be utilized by the committee on rivers and harbors in preparing its bill for the short session of congress. The statements set forth that the object of the improvements from Lake Superior to Lake Huron is to obtain a depth of 21 feet and greater width in some places. Deepening of the Hay Lake channel is required, and both deepening and widening at the Neebish where so much serious trouble was had with the Houghton blockade last fall. In addition lengthening of the old canal at the "Soo" is contemplated, which, in itself, is a mammoth undertaking. Altogether the improvements as outlined by Col. Lydecker will cost upwards of $9,000,000.

Summer outings.—Before deciding when and where to spend a portion of the hot season this year, send for the booklet issued by the Nickel Plate road, entitled "Summer Outings," including many picturesque points on the south shore of Lake Erie and the classic shores of Lake Chautauqua. Sent to any address upon application to B. F. Horner, general passenger agent, Cleveland, O. No. 101, July 6.

A NAVY WORTHY OF THE NATION.

REPRESENTATIVE CUMMINGS, ONE OF THE MOST ARDENT ADVOCATES OF A POWERFUL NAVY, REVIEWS THE APPROPRIATIONS OF THE LAST SESSION OF CONGRESS.

"The people of the United States," said Representative Amos J. Cummings, "can hardly realize the importance of the naval appropriation bill just signed by the president. First in importance is the armor plate question which has definitely been settled. For four years congress has been answering the great popular demand for an increased navy by authorizing the building of ships and then refusing to provide for their construction upon the ground that the armor plate manufacturers wanted too much per ton for their armor. This action was taken despite the fact that the manufacturers were ready to furnish the Krupp plate at a much lower rate per ton than had been paid by any other government. Congress went so far as to put the limit at $300 per ton, although the lowest rate ever paid was that paid by the Russian government under the contract with the Cramps at $565 per ton. Japan has paid as much as $700 per ton. I am glad that the question has been settled for all time. At the beginning of the controversy we had more battleships and cruisers authorized and under construction than we had afloat on the ocean. I am satisfied that the work upon these seventeen vessels will be begun immediately and that they will be finished as rapidly as possible. It will take seven or eight years, if not more, to complete them even as it is. It is exceedingly gratifying to know that our navy at the end of ten years, even without the authorization of another vessel, will equal what the German emperor is striving to accomplish within fifteen years.

"Another important point is the fact that all these ships are to be sheathed. This solves, in a measure, the dock problem. Admiral Dewey says that sheathed ships preserve their speed four times as long as those unsheathed, and need docking only once in two years, while the unsheathed vessels should be docked once in every nine months. I have only one regret and that is that congress did not authorize the construction of the twelve gunboats called for by the secretary. I offered an amendment in the house providing for six such boats, but was outvoted. For some reason the senate overlooked the matter.

"Meantime, congress did well in authorizing the construction of the new docks at New York and Norfolk. The dock at Port Royal will probably be moved to Charleston. They should have moved it the other way. Brunswick was the place for it if it was to be moved, but I see no reason whatever for its removal. Of course, it was in disfavor with the navy department because there was no attraction for naval officers at Port Royal. Charleston was more within their ideal, and all naval officers would have preferred Newport or Bar Harbor. At all events, Port Royal never had a fair show. Very few ships were sent there on account of the lack of society. There is no dock along the coast between Charleston and New Orleans. Congress saw fit to appropriate $300,000 for the floating dock in Havana. This dock, when bought, will probably be moved to San Juan. The New Orleans dock will be completed within a year. This will give us ample docking facilities for all classes of vessels at seven different points—one on the Pacific coast, five on the Atlantic coast, and one on the Gulf of Mexico.

"More gratifying than all is the appropriation for the hydrographic office. There should have been no trouble about it whatever. The functions of the coast and geodetic survey and of the hydrographic office are entirely distinct. The former charts all the coasts and harbors of the country for the benefit of navigation and commerce. Aside from this, it determines the pathway of the gulf stream and similar currents on the ocean. In fact, it performs special duties, and therefore will have nothing to do with hydrography. The hydrographic office procures and republishes charts made by other nations and directs surveys on foreign unsurveyed coasts, when opportunity permits, and publishes charts of such surveys and sells them to navigators. Hydrographic work is never completed. It will continue as long as commerce lasts, because changes are occurring eternally in coast lines and sea bottoms and the safety of navigation requires frequent recharting. Foreign charting goes to the hydrographic office and home charting to the coast and geodetic survey. The assault upon the hydrographic survey by the chairman of the committee on appropriations was made on false premises, apparently inspired by personal pique. If persisted in it will be detrimental to both branches of the service, and entail upon the country an expense totally unwarranted by the situation. Fortunately there is no politics in the hydrographic office and unfortunately the coast and geodetic survey is saturated with it. There is no civil service examination, and the bitterest enemies of the hydrographic office were those who were seeking patronage under the coast and geodetic survey.

"I am glad that the president has $300,000 set apart to be expended at his discretion to meet unforseen contingencies for the maintenance of the navy. It is something new and a hard fight was made against it. But until some definite policy with regard to our insular possessions is outlined it is really necessary for the protection of the country, and such appropriation should be continued until all danger is past. I was sorry that the electricians at the navy yards were not graded so as to increase their salaries. They are not paid today as much as an ordinary police officer in New York is paid for his services. Personally I rejoice at the increase of the limit for the reconstruction of the naval academy. The senate did a wise thing. We ought to have the finest naval academy in the world. Within fifty years we will be the great maritime nation on the face of the earth, and have a navy corresponding in strength, of which all Americans will be proud. Men may talk about the era of universal peace, but there will never be any such era. The complications in China and the aggressions of the French upon Morocco together with the operations in Russia on the Persian gulf and the relaxation of the claws of the Russian bear, preparatory to the seizure of Constantinople, all indicate wars to come that will exceed in magnitude all others. Whether we will or not we are bound to be sufferers if we are not prepared for such wars, and if prepared, our rights will be respected by all. Our naval academy ought to be the best in every respect in the world and I have no sympathy with the carping of those who are striving to belittle it. I regret that the house proposition to issue diplomas to naval cadets at the end of every four years was not adopted. I am satisfied, however, that it will be adopted within the next two years.

"The provision for the five submarine boats is peculiarly gratifying. We shall be the only nation, beside the French, who are provided with these boats. In case of a sudden war their services will be invaluable. I notice that Louis Nixon, who has just returned from Europe, says that the British Admiralty is making a thorough study of this subject, and I venture the prediction now that within a year they will be vieing with us in the construction of such boats. Indeed, Mr. Nixon says that they have already agreed that the Holland boat is the most perfect type of submarine construction that has yet been produced. Our government should have provided for the building of at least twenty of them instead of five. I think there is no doubt but what at least ten more will be authorized next year.

"All I want is that the reconstruction and increase of the United States navy, begun under such favorable auspices by Secretary Chandler and Secretary Whitney and continued under Secretaries Tracy, Herbert and Long, be persistently continued until the American navy becomes worthy of the American nation. Even as it is, its prowess has already been recognized by the nations of the earth who appreciate its strength and its worth, and no longer evince a disposition to encroach upon our rights and prerogatives. I have been an ardent advocate of the increase of the navy ever since I have been in congress, and certainly have no inclination to swerve at this hour. The people not only want but demand a powerful navy and as long as I am in public life I intend to voice that demand. Money spent for this purpose is money well spent. A strong navy is practically a guarantee of peace."

ONE OF ENGLAND'S FINEST CRUISERS.

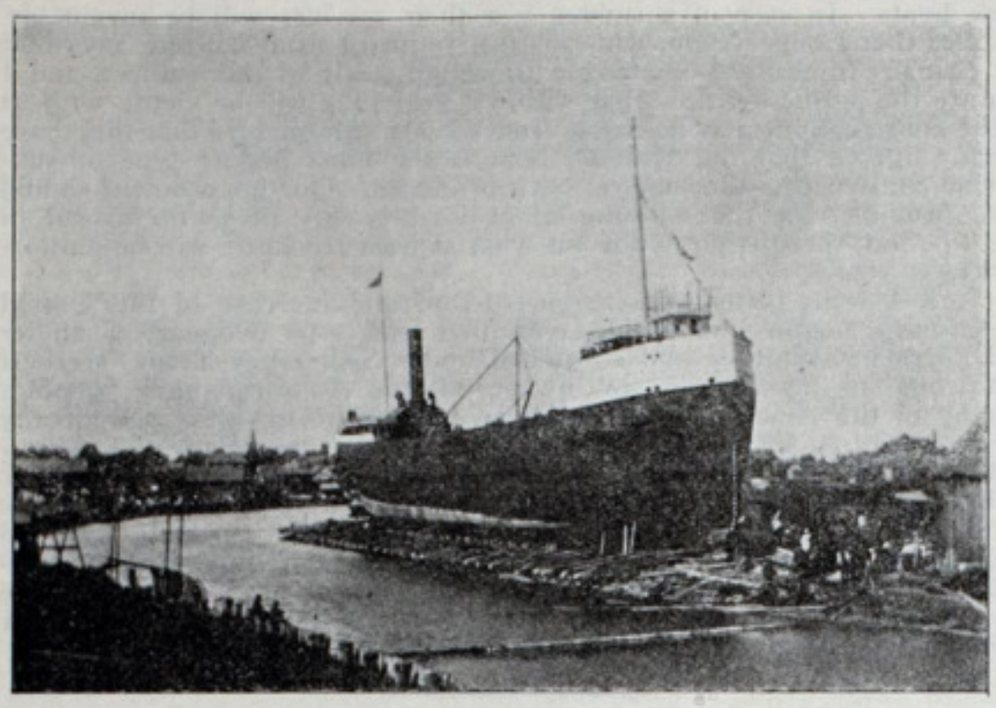
An armored cruiser of the highest type now being built by the British government is the Aboukir, launched recently from the works of the Fairfield company, Govan, Scotland. The Aboukir belongs to what is known as the Cressy type of cruiser. Her dimensions are: Length, 440 feet between perpendiculars; breadth, 69 feet 6 inches; displacement, 12,000 tons. The armor is 6 inches in thickness, and the speed with 21,000 indicated horse power will be 21 knots. The armament will be heavier than that which obtains in the protected cruisers of the Diadem class, so that the fitness of the new class as all-round fighting ships may hardly be questioned. The side armor is of specially hardened steel 6 inches in thickness, whilst the bulkheads are 5 inches. The side protection is further extended from the citadel to the stern by the introduction of nickel steel plating 2 inches in thickness. The protective deck proper extends from stem to stern, and ranges from 1½ inches to 2½ inches in thickness, the sections over the steering arrangement being further increased to 3 inches. This deck is worked at the lower edge of the armored citadel, and protects the vitals of the ship. Another deck, 1 inch thick, forms the crown of the citadel. The general construction of the hull is similar to that usually adopted in the service, being extensively sub-divided into water-tight compartments. The bunkers are along the sides of the machinery compartment, below and above the lower deck, and are provided with the usual fittings for rapidly handling and distributing the fuel. The vessel's normal coal capacity is 1,000 tons, but this can be doubled if necessary, ample space being allotted for this essential requirement. At the fore end of the vessel is a conning tower of 12-inch Harveyized steel, with a communicating tube to protect the gear for controlling operations throughout the ship. There are two navigating bridges, with the usual appliances, one forward and one aft. The vessel is sheathed with teak of a minimum thickness of 4 inches, which, as is usual, will be coppered later at the dock yard. The complement of crew is 750 officers and men, and the most ample provision has been made for their accommodation. All the furniture will be of wood rendered non-inflammable by a special process. An electric installation is arranged for thoroughly lighting the vessel, whilst six powerful searchlights are fitted, four on the bridge and one on each mast, on a platform of great elevation.

The propelling machinery consists of two sets of triple-expansion engines fitted in water-tight compartments, each set having four inverted cylinders working on four cranks. The high pressure cylinder is 36 inches in diameter, the intermediate pressure cylinder 59 inches diameter, and each of the low pressure cylinders 68 inches diameter—all adapted for a stroke of 4 feet. The high pressure and intermediate pressure cylinders are each fitted with a piston valve, and each low pressure cylinder with a double-ported slide valve with a relieving ring at the back, all the valves being worked by the usual double eccentric and link motion gear. The reversing is effected by means of double-cylinder steam engines with gear of the all-round type, hand gear also being fitted. The crank, thrust, and propeller shafting is of forged steel, and hollow. Each of the propellers has a boss of gun-metal fitted with four adjustable blades of manganese bronze. The main condensers are placed at the back of the engines, and are cast brass of oval form fitted with brass tubes, the condensing water being supplied by four centrifugal pumps of gun-metal, each fitted with independent engines. The feed, bilge, and hot-well engines are all independent and separate from the main engines, steam for these and for all other auxiliary machinery being supplied by a special range of steam pipes. The exhaust steam will be arranged to discharge to the auxiliary condensers, the atmosphere, and the low-pressure receivers. There are two auxiliary condensers, each fitted with a circulating pump and a small air pump.

Steam will be supplied by an installation of thirty water-tube boilers and economizers of the latest Belleville type. The boilers are arranged in four groups, each group fitted in a water-tight compartment; they are designed to work at a pressure of 300 pounds, reducing valves being fitted to reduce the steam pressure to 250 pounds at the engines. Air pumping engines are fitted in each stokehold to supply air to the furnaces and combustion chambers, and the necessary air for the ventilation of the stokehold will be supplied by large fans. Fans will also be fitted for engine room and ship ventilation.

CHARTS OF THE ST. LAWRENCE.—It frequently happens that owners of steam yachts passing between the lakes and the Atlantic want charts of the St. Lawrence river, and want them in a hurry. The Marine Review has them on hand all the time—complete from Lake Ontario to the Gulf of St. Lawrence.

WOODEN FREIGHT STEAMER ALFRED MITCHELL.



BUILT BY SIMON LANGELL, ST. CLAIR, MICH.—CAPACITY, 2,800 TONS.

NAUTICAL SCHOOL IN BUFFALO.

Charles de Kraft, nautical expert in the Buffalo branch of the hydrographic office, will open a nautical school in Buffalo next winter. He has just returned to Buffalo from Chicago after consulting Commander W. J. Wilson, principal of the Chicago nautical school, as to the practicability of the plan. Mr. Kraft found while in Chicago that the scheme would appeal to marine men, and he decided to go into the venture on the recommendation of Commander Wilson. The Buffalo school will be run after the plan governing the nautical institution in Chicago. Classes will be formed for masters, mates, sailors and yachtsmen.

CHART NO. 1 OF ST. MARY'S RIVER has just been issued. Vessel masters of the great lakes have been looking for it for a long time past. It shows on a very large scale all the lower part of the river extending down from the lower end of Mud lake, where chart No. 2 begins, and including Detour, Drummond island and the lower part of St. Joseph's island, east and west, extending over to what is known as the North channel. This chart may be had from the Marine Review at 50 cents, or all three charts of the river at $1.50.

PNEUMATIC RIVETERS.

The front cover of the Q. & C. Co.'s catalogue for 1900 on the subject of pneumatic tools is a poster of most exquisite design, simple but most effective. Discussing the subject of pneumatic riveting the catalogue says:

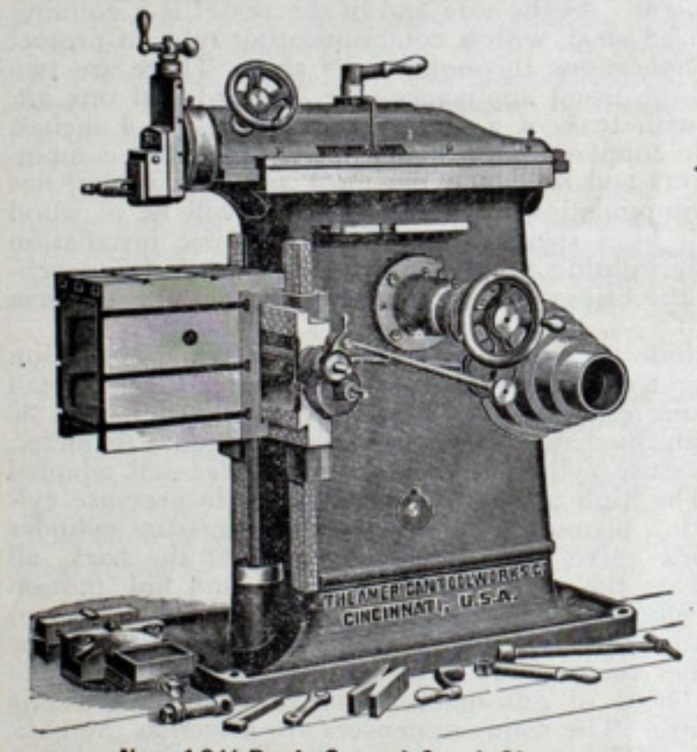
"During the last two or three years pneumatic riveters have made rapid headway and are now extensively used on ship building, structural and boiler work. While many difficulties have been met with in the attempt to do work with these machines that would compete with that accomplished by pressure riveters, they have been overcome by careful experimenting and through recent improvements, and the Q. & C. Co. is prepared to furnish riveters that are guaranteed to perform work equal to that accomplished by any other method. Pneumatic riveters possess several great advantages over pressure machines, on account of their lightness, cheapness, portability and the ease with which yokes can be made to suit structures of special form, in many cases a pneumatic riveter being applicable where others could not be used on account of insufficient space. As compared with hand work they will not only accomplish better work, but will do it at less than one-third of the cost. To do good work with a pneumatic riveter, as with any other riveter, it is necessary not only to head the rivet properly but to upset the rivet throughout its length and thoroughly plug the hole. Experiments have shown that whether this is done or not depends almost entirely on the weight of striking hammer employed and only to a small extent on the velocity with which it strikes the rivet. It is possible to form an almost perfect head with a comparatively light hammer, but the effect of the blow is absorbed by the end of the rivet and it is not upset in the sheet. After careful experimenting the Q. & C. Co. has adopted a hammer weighing 4½ pounds for driving rivets up to ⅞ inch diameter and 8 pounds for rivets up to 1¼ inches diameter, and have found that with such hammers good work can be accomplished."

SUMMER TOURS FOR 1900.

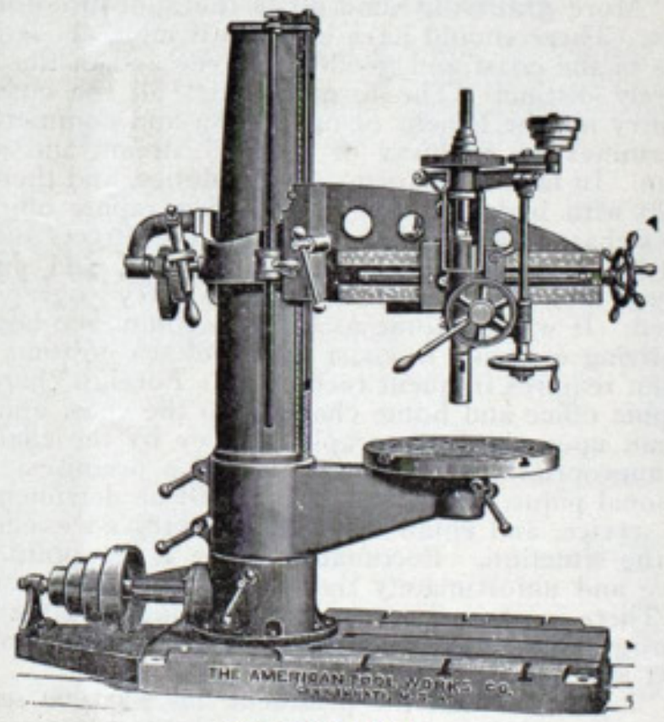
Under the title "Summer Tours for 1900" the Cleveland & Buffalo Transit Co. has issued a very attractive book. Much credit must be given to W. F. Herman, general passenger agent, for the excellence of the work. It is a complete symposium of what there is to see on the inland waterways. The book is well illustrated throughout. The opening chapter is devoted to what may be seen on the C. & B. line itself and then follows descriptions of the cities of Cleveland, Buffalo and Toledo. Each of these cities is a mecca in itself. Descriptions are also given of Niagara Falls, the Thousand Islands, Montreal and Quebec and the places reached by the boats of the Richelieu & Ontario Navigation Co., with which the C. & B. line makes connections. There follows naturally descriptions of Michigan and Mackinac and the points of interest reached by the Detroit & Cleveland Steam Navigation Co. Altogether for one who is looking for some attractive place wherein to spend a vacation it is an invaluable guide.

Machine Tools

LATHES, PLANERS, SHAPERS,
BORING and TURNING MILLS,
UPRIGHT and RADIAL DRILLS,
SCREW MACHINES,
PULLEY LATHES,
BOLT CUTTERS, Etc.



New 16″ Back Geared Crank Shaper.



3′ Radial Drill.

The American Tool Works Co.,

BUILDERS OF COMPLETE LINES OF MACHINE TOOLS,

WORKS: CINCINNATI, U. S. A.

NEW YORK OFFICE: 120 Broadway, Geo. Place, Agent.
NEW ORLEANS: The Fairbanks Co.
CHICAGO STORE: 68-70 South Canal Street.
PHILADELPHIA: The Fairbanks Co.
CLEVELAND: The Strong, Carlisle & Hammond Co.
BOSTON STORE: 36 Federal Street.
BALTIMORE: The Fairbanks Co.

SAN FRANCISCO: Henshaw, Bulkley & Co.
DENVER AND SALT LAKE CITY: The Mine & Smelter Supply Co.
LONDON: Alfred Herbert, Ltd., 7 Leonard St., Finsbury, E. C.
DÜSSELDORF: de Fries & Co., Act. Ges., Graf Adolf Strasse, 83-87

ANTWERP: Nyssens Freres, 33 Rue des Peignes.
BERLIN: de Fries & Co., Act. Ges., Kloster Strasse, 13-15.
PARIS: Roux Freres & Cie., 54 Boulevard du Temple.
MOSCOW: Alfred Stucken.

TRADE NOTES.

Hollow stay bolts, made by the Falls Hollow Staybolt Co., Cuyahoga Falls, O., have been specified for several boilers that are being built by the Harlan & Hollingsworth Co. of Wilmington, Del.; also for boilers building by the Morgan Iron Works, Bath Iron Works, Moran Bros. Co. and others.

The Westinghouse companies' publishing department has just issued in book form, well printed and well illustrated, Mr. Walter C. Kerr's address on "The Mechanical Equipment of the New South Sation, Boston, Mass.," which was presented at the meeting of the American Society of Mechanical Engineers in New York last December.

A large chain making plant is being erected at Hays Station, Pa., by the recently-organized Carter Ball Bearing Chain Co. It is expected to have the plant completed and machinery all in so as to start work July 1. The promoters propose to spend $100,000 on the new enterprise. The building will measure 50 by 160 feet and is to be entirely of iron.

With the consolidation of lake ship yards the Detroit Sheet Metal & Brass Works was absorbed by the Detroit Ship Building Co. and the business of marine hardware, brass, copper and sheet metal is now conducted by the ship building company. But in this line the Detroit company is, of course, seeking trade aside from that which it has on account of ship building. A catalogue just at hand deals entirely with lubricating devices, all of them of improved kind. This concern has probably given more attention to lubricators than any other works in the country.

For the past twelve years the firms of Robert W. Hunt & Co. and Hallsted & McNaugher, and the latter's predecessors, G. W. G. Ferris & Co., have been associated as consulting engineers, inspectors of rails, structural and bridge materials, locomotives, cars, machinery, etc., each conducting its own business under the respective firm names. That the interest of clients may be even more fully protected, it has been decided to merge the two firms into one organization, to be known as Robert W. Hunt & Co., the partners being Robert W. Hunt, John J. Cone, A. W. Fiero, James C. Hallsted and D. W. McNaugher. The firm's offices will remain at 1121 the Rookery, Chicago; Monongahela Bank building, Pittsburg, Pa., and 71 Broadway, New York.

In one day recently Mr. L. L. Hills, representing the Q. & C. Co. of Chicago at the Paris exposition, had the following callers making inquiries about the Chicago company's pneumatic tools and sawing machines: F. Ctibor, 970 Buen Orden, Buenos Ayres, Argentine; Charles Mukes, engineer, Tiree, Athens, Greece; Adolf Scharffe, imperial arsenal, Tientsin, China; Samuel Platt, Wednesbury, England; Alfred Sreiser, engineer, Automobile Co., Berlin, Germany; Hofheer Schrentz, engineer, Vienna, Austria; Hans Ceftek, Kolowistring 12, Vienna, Austria; M. Hugot, 104 Guai Jemmaces, Paris, France; Alfred Kairesse, iron manufacturer, Wignihein, North of France; Ferdinand Guillon, engineer, 48 Rue St. Honorse, Cherbourg, France.

VALUE OF STOCKS—LEADING IRON AND STEEL INDUSTRIALS.

Quotations furnished by HERBERT WRIGHT & Co., Cleveland, date of June 20, 1900.

NAME OF STOCK.	OPEN	HIGH	LOW	CLOSE
American Steel & Wire.....	31¼	31¾	30½	30½
American Steel & Wire, Pfd.....	72	72	72	72
Federal Steel	31¼	31¾	30¾	31
Federal Steel, Pfd.....	65	65	64	64
National Steel	24⅛	24½	24	24
National Steel, Pfd.....	.....	.....	.....	.....
American Tin Plate	18¼	18¾	18¼	18½
American Tin Plate, Pfd.....	73	.....	.....	73
American Steel Hoop.....	17½	18⅝	17½	18⅝
American Steel Hoop, Pfd.....	.....	.....	.....	.....
Republic Iron & Steel	10⅛	10⅛	10	10⅛
Republic Iron & Steel, Pfd	50⅞	51	50	50

Treasury Department, Office of General Superintendent U. S. Life-Saving Service, Washington, D. C., June 18, 1900. Sealed proposals will be received at this office until 2 o'clock p. m. of Thursday, the 12th day of July, 1900, and then publicly opened, for furnishing supplies required for use of the Life-Saving Service for the fiscal year ending June 30, 1901; the supplies to be delivered at such points in New York City, Grand Haven, Mich., and San Francisco, Cal., as may be required, and in the quantities named in the specifications. The supplies needed consist of Beds and Bedding; Blocks and Sheaves, Cordage; Crockery; Furniture; Hardware, Lamps, Lanterns, etc.; Lumber, Medicines, etc.; Paints, Oils, etc.; Ship Chandlery; Stoves, etc.; Tools, and Miscellaneous Articles; all of which are enumerated in the specifications attached to the form of bid, etc., which may be obtained upon application to this office, or to the Inspector of Life-Saving Stations, 17 State Street, New York City; Superintendent Eleventh Life-Saving District, Grand Haven, Mich.; and Superintendent Twelfth Life-Saving District, New Appraisers' Stores, San Francisco, Cal. Envelopes containing proposals should be addressed to the "General Superintendent U. S. Life-Saving Service, Washington, D. C.," and marked on the outside "Proposal for Annual Supplies." The right is reserved to reject any or all bids, and to waive defects, if deemed for the interests of the Government. Horace L. Piper, Acting General Superintendent. June 28

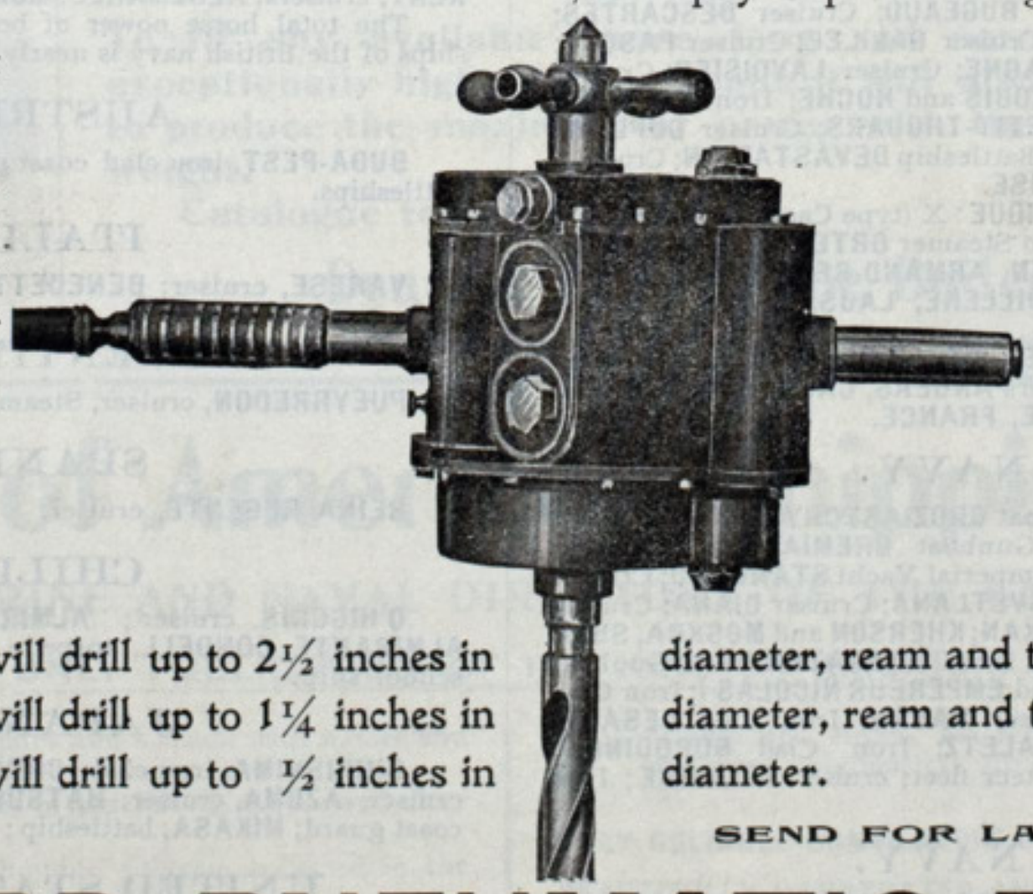
THE ONLY PISTON AIR DRILLS

That have Double-Balanced Piston Valves are the

"LITTLE GIANT"

SPECIALLY DESIGNED FOR SHIP BUILDING.—They consume fifty per cent less air and do far more work than rotary or any other type of air drills. If you want to verify this we will send a machine on trial, and pay express charges both ways.

Our Machines are made to withstand hard service. They can be operated in a bath of oil. Used by 85 per cent of the railways in this country. Absolutely no vibration.



Guaranteed against repair for one year. Made entirely of steel. Can be operated close to a corner and in any position. We can furnish them in any size.

No. 1.—Weight 27 lbs., will drill up to 2½ inches in diameter, ream and tap up to 2 inches.
No. 2.—Weight 17 lbs., will drill up to 1¼ inches in diameter, ream and tap up to 1 inch.
No. 3.—Weight 8 lbs., will drill up to ½ inches in diameter.

SEND FOR LATEST CATALOG.

STANDARD PNEUMATIC TOOL CO.

Manufacturers of Pneumatic Tools of All Kinds,

Marquette Building, CHICAGO. 141 Broadway, NEW YORK.

REPORT OF DEEP WATERWAYS COMMISSION.

It is now announced from Detroit that about June 30 the final report of the deep waterways commission will be sent to Secretary of War Root. The report will embody the information concerning the cost and practicability of establishing a deep waterway from the head of the great lakes to the seaboard. Three routes from the lower lakes to the Atlantic have been found suitable by the commissioners and their report will give the cost of each, the advantages of each, and the ultimate economical advantages possessed by each. The one that will prove most profitable to navigation in the long run will be recommended. The report will be but the readable conclusions drawn from the three years' work of the commission. Some ten or twelve days later the data and mathematical work leading up to the summary will follow. The technical appendix will include about 2,000 pages.

Engineer Geo. Y. Wisner of Detroit is overwhelmed with work, as most of the labor of closing up the commission's work falls upon him. Col. Raymond, one of the commissioners, is confined to his house in Philadelphia most of the time owing to ill health, and Mr. Noble, the third member, is also on the isthmian commission, and can give but little of his time to the deep waterway work. In the consideration of the cost of a 21-foot channel and also of a 30-foot channel, both of which were requested as part of the commission's work, a very radical, and to lake marine men very interesting, initiative will be taken. It will be strongly recommended that a fixed depth be established for the vessel channels of the lakes, and it will be advised that beyond this depth it will not be economical to go.

Mr. Wisner says: "In view of the consideration of various depths of channels we shall show that beyond a certain depth of water it will be a loss of money to dig deeper. Owing to the incomplete report it would not do to state what that limiting depth will be, but the continual growth of vessels ever crowding upon the bottom and creating a call for still deeper water has got to end somewhere. So long as the cost of digging out the bottom is less proportionately than the money to be saved by the reduced rates incident on a greater carrying capacity occasioned by deeper water, the deep channels will be profitable, but when the interest on the cost of deepening the waterways exceeds the gain to the public through the marine interests then it is time to stop. The report will advise on a final fixed depth. In time, as the smaller boats disappear, there will be found a uniform size of lake boats, and the claim of discrimination against the little fellows will be heard no more. So long as you go on deepening the channels it is evident that the boats built for the shallower depth will suffer at the hands of the larger craft."

It is reported that three of the revenue cutters in use along the New England coast—the Woodbury at Portland, the Dallas at Vinyard Haven and the Dexter at New Bedford—are to be sent to Porto Rico to serve as revenue patrols.

RUMORS OF ANOTHER ARMOR PLATE WORKS.

In answer to an inquiry regarding the rumor that armor plate would shortly be manufactured at the works of the Midvale Steel Co., Nicetown, Pa., one of the officers of that company says: "We would prefer not to be quoted at all in this matter." A press dispatch from Philadelphia on the subject is as follows:

"For a number of years the Midvale company has done considerable work for the government, supplying large quantities of armor piercing projectiles, castings, shaftings, forgings, and the highest steel work for naval construction. Some months ago the company contracted for special machinery and presses for the work of armor plate making. They have a plant covering fifty-four acres, and upon it several large buildings known as the armor plate extension have been erected. Nearly all the machinery is said to be in position, and as soon as the oil tempering apparatus is complete the active making of projectile resisting armor can go on. The company has a secret process for hardening the plate which, it is claimed, will surpass the Harveyized and Krupp product, and experienced workmen have been engaged for the new department. The capacity of the new plant, it is stated, will be almost equal to that of the Bethlehem and Homestead armor plate plants combined. With the machinery and construction of the buildings the company are said to have put over $3,000,000 into the venture.

Stockhoders of Jones & Laughlins, Ltd., Pittsburg, reorganized a few days ago under the recently obtained charter, which prescribes a capitalization of $20,000,000. Benjamin F. Jones, Jr., will succeed his father, Benjamin F. Jones, as chairman. Willis S. King, who has been secretary, was elected vice-chairman to succeed Major G. M. Laughlin. Irwin B. Laughlin was chosen to succeed B. F. Jones, Jr., as treasurer. William C. Moreland, who has been auditor, was elected secretary, and William L. Jones retains his present position of general manager, and Charles C. Briggs, sales agent. James B. Laughlin, Roland Gerry, Thomas O'C. Jones, together with the executive officials, comprise the board of managers. Thomas K. Laughlin was elected assistant treasurer. The advisory board is made up of Benjamin F. Jones, Henry A. Laughlin, George M. Laughlin, James Laughlin, Jr., and Benjamin F. Jones, Jr.

The British navy is experimenting with two new varieties of fuel in place of Welsh steam coal. One is a mixture of anthracite coal with some other materials, the nature of which is not divulged, compressed into small blocks, and the other consists largely of Welsh coal residue. Four first-class battleships have shipped several hundred tons of this fuel. The reason for this action is probably due to the fact that the admiralty sometimes experience great difficulty in obtaining sufficient quantities of the Welsh coal. A short time ago the stock of this coal at Portsmouth was exceptionally low and the question was raised in parliament as to whether some other fuel could not be discovered that would fulfill the exigencies of the navy with equal satisfaction.

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GRAND PRIZE AT THE WORLD'S FAIR OF 1889.

List of Ocean Steamships on Board which BELLEVILLE GENERATORS are Used.

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Despatch Boat **VOLTIGEUR**; Squadron's Look-out Ship **MILAN**; Squadron's Look-out Ship **HIRONDELLE**; Gunboat **CROCODILE**; Despatch Boat **ACTIF**; Cruiser **AMIRAL RIGAULT DE GENOUILLY**; Iron Clad Cruiser **ALGER**; Iron Clad Cruiser **LATOUCHE-TREVILLE**; Iron Clad Cruiser **CHANZY**; Iron Clad Cruiser **AMIRAL CHARNER**; Tug **ABERVRAC'H**; Despatch Boat **CAUDAN**; Torpedo Despatch Boat **LEGER**; Torpedo Despatch Boat **LEVRIER**; Battleship **BRENNUS**; Protected Coast Guard **AMIRAL TREHOUART**; Iron Clad Cruiser **BRUIX**; Iron Clad Cruiser **BUGEAUD**; Cruiser **DESCARTES**; Battleship **BOUVET**; Cruiser **POTHUAU**; Cruiser **GALILEE**; Cruiser **PASCAL**; Cruiser **CATINAT**; Battleship **CHARLEMAGNE**; Cruiser **LAVOISIER**; Cruiser **PROTET**; Battleships **GAULOIS, SAINT LOUIS** and **HOCHE**; Iron Clad **IENA**; Cruiser **DESAIX**; Iron Clad Cruiser **DUPETIT-THOUARS**; Cruiser **DUPLEIX**; Cruiser **FURIEUX**; Battleship **NEPTUNE**; Battleship **DEVASTATION**; Cruisers **SULLY, AMIRAL AUBE** and **MARSEILLAISE**.

COMP. GENERALE TRANSATLANTIQUE: X (type Caen) **LAQUEBOT**.

MESSAGERIES MARITIMES: Cargo Steamer **ORTEGAL**; Mail Steamships **SINDH, AUSTRALIEN, POLYNESIEN, ARMAND-BEHIC, VILLE-DE-LA-CIOTAT, ERNEST-SIMONS, CHILI, CORDILLERE, LAOS, INDUS, TONKIN, ANNAM, ATLANTIQUE**.

COMPAGNIE DES CHEMINS DE FER DE L'OUEST, (Plying between Dieppe and Newhaven): Freight Steamers **ANGERS, CAEN, BREST, CHERBOURG**; Fast Steamers **TAMISE, MANCHE, FRANCE**.

RUSSIAN NAVY.

Iron Clad Frigate **MININE**; Gunboat **GROZIASTCHY**; Imperial Yacht **MAREVO**; Imperial Yacht **STRELA**; Gunboat **GREMIASCHY**; Gunboat **OTVAJNI**; Imperial Yacht **TZAREWNA**; Imperial Yacht **STANDARD**; Cruiser **ROSSYA**; School Ship **VERNY**; Cruiser **SVETLANA**; Cruiser **DIANA**; Cruiser **PULLADA**; Torpedo Transport Boat **BAKAN**; **KHERSON** and **MOSKBA**, Ships of the Volunteer Fleet; Gunboat **GILACH**; Iron Clad **EKATERINA II**; Gunboat **KOUBANETZ**; Cruiser **AURORA**; Iron Clad **EMPEREUR NICOLAS I**; Iron Clad **PRINCE POTIEMKINE DE TAURIDE**; Cruiser **BAYAN**; Iron Clad **CESAREWITCH**; Gunboats **TERETZ** and **OURALETZ**; Iron Clad **BORODINOW**; **SMOLENSK**, Ship of the Russian volunteer fleet; cruiser **BOJARINE**; Iron Clad **SINOPE**.

ENGLISH NAVY.

Torpedo Boat Destroyer **SHARPSHOOTER**; **POWERFUL** and **TERRIBLE**, iron clad cruisers; **GLADIATOR, ARROGANT, FURIOUS, VINDICTIVE**, cruisers; **NIOBE, DIADEM, ANDROMEDA, EUROPA**, cruisers; **CANOPUS, GLORY, GOLIATH, ALBION, OCEAN**, iron clad ships; **ARGONAUT, ARIADNE, AMPHITRITE, SPARTIATE, HERMES, HIGHFLYER** and **HYACINTH**, cruisers; **VENGEANCE**, iron clad; **ALBERT AND VICTORIA**, royal yacht; **CONDOR** and **ROSARIO**, sloops; **CRESSY, ABOUKIR, SUTLEY** and **HOGUE**, cruisers; **IMPLACABLE, FORMIDABLE** and **IRRESISTIBLE, VENERABLE, LONDON, BULWARK**, iron clad ships; **EURYALUS, BACHANTE**, cruisers; **MUTINE, RINALDO, SHEARWATER**, sloops; **CORNWALLIS, DUNCAN, EXMOUTH, RUSSEL**, iron clad ships; **DRAKE, KING ALFRED, LEVIATHAN, AFRICA**, cruisers; **VESTAL**, sloop; **MONMOUTH**, cruiser; **BEDFORD**, cruiser; **ESSEX, KENT**, cruisers; **ALBEMARLE, MONTAGUE**, battleships.

The total horse power of boilers fitted on board the 57 above named ships of the British navy is nearly 900,000.

AUSTRIAN NAVY.

BUDA-PEST, iron clad coast guard; **KAISER KARL VI**, cruiser; **X', X'''**, battleships.

ITALIAN NAVY.

VARESE, cruiser; **BENEDETTO BRIN**, battleship.

ARGENTINE REPUBLIC.

PUEYRREDON, cruiser; Steamships **PUERTO-HUERGO** and **MENDOZA**.

SPANISH NAVY.

REINA REGENTE, cruiser.

CHILIAN NAVY.

O'HIGGINS, cruiser; **ALMIRATE LYNCH**, torpedo boat destroyer; **ALMIRANTE CONDELL**, torpedo boat destroyer; **GENERAL BAQUEDANO**, school ship.

JAPANESE NAVY.

SHIKISHIMA, iron clad; **CHIYODA**, cruiser; **ASAHI**, iron clad; **IWATE**, cruiser; **AZUMA**, cruiser; **HATSUSE**, iron clad; **ITSUKUSHIMA**, iron clad coast guard; **MIKASA**, battleship; **TZUMO**, cruiser.

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Northern Steamship Co.'s Passenger Steamers **NORTH WEST** and **NORTH LAND**, of 7,000 H. P. each; yachts **SHEARWATER, CORYELL, WILD DUCK, SULTANA**.

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For a copy of "The Lake Superior Country," containing a description of Marquette and the copper country, address, with four (4) cents in stamps to pay postage, Geo. H. Heafford, General Passenger Agent, Chicago, Ill. July 26

The Nickel Plate road will sell excursion tickets for the 4th of July at one fare for the round trip, within a radius of 200 miles, good going July 3 and 4 and returning until the 5th inclusive. Write, wire, 'phone or call on nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O. 107, June 28

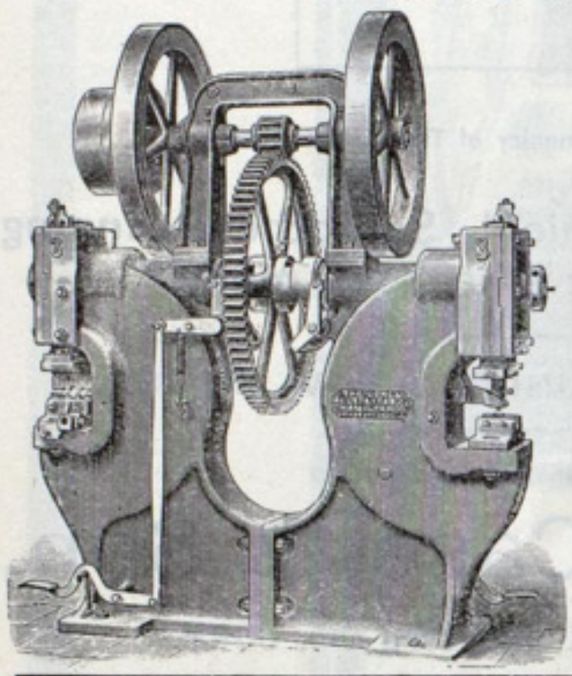
U. S. Engineer Office, Buffalo, N. Y., June 20, 1900. Sealed proposals for construction of concrete superstructure on south pier at Buffalo, N. Y., will be received here until 11 a. m., July 10, 1900, and then opened. Information furnished on application. T. W Symons, Major, Engrs. July 5

Sealed proposals for furnishing armor for naval vessels will be received at the Navy Department until 12 o'clock, noon, August 10, 1900, when they will be publicly opened. Forms of proposals and all necessary information may be obtained from the Chief of the Bureau of Ordnance, Navy Department, Washington, D. C. F. W. Hackett, Acting Secretary. 6-18-1900. July 28

U. S. Engineer Office, Vicksburg, Miss., May 28, 1900. Sealed proposals for excavating 7,500,000 cubic yards of earth, more or less, along route for diverting mouth of Yazoo River, near Vicksburg, Miss., will be received here until 3 o'clock, p. m., June 28, 1900, and then publicly opened. Information furnished on application. Thos. L. Casey, Major, Engrs. June 21.

U. S. Engineer Office, Galveston, Tex., May 30, 1900. Sealed bids in triplicate, for Improving Galveston Ship Channel and Buffalo Bayou, Tex., by dredging, etc., will be received until 2 p. m., June 30, 1900, and then publicly opened. For information apply to C. S. Riche, Capt., Engrs. June 21.

LABOR-SAVING



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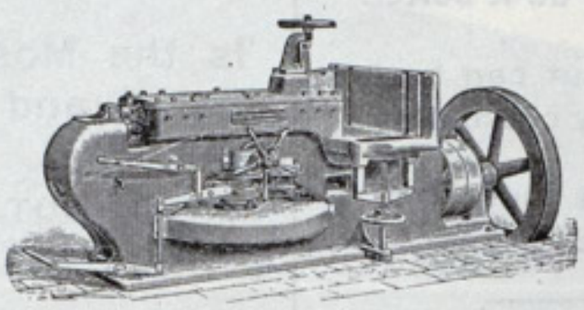

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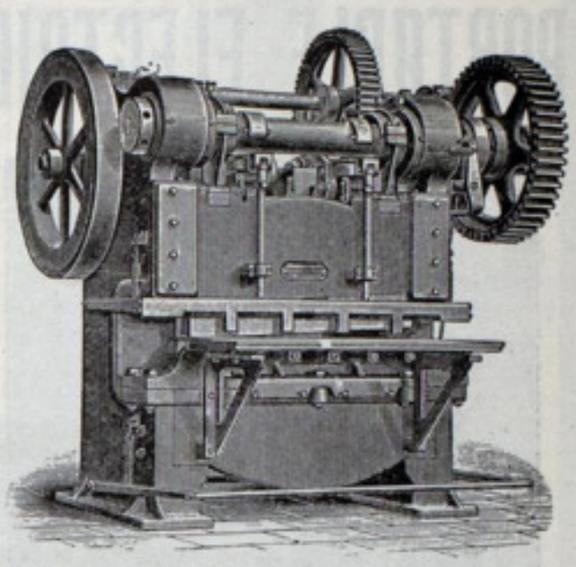

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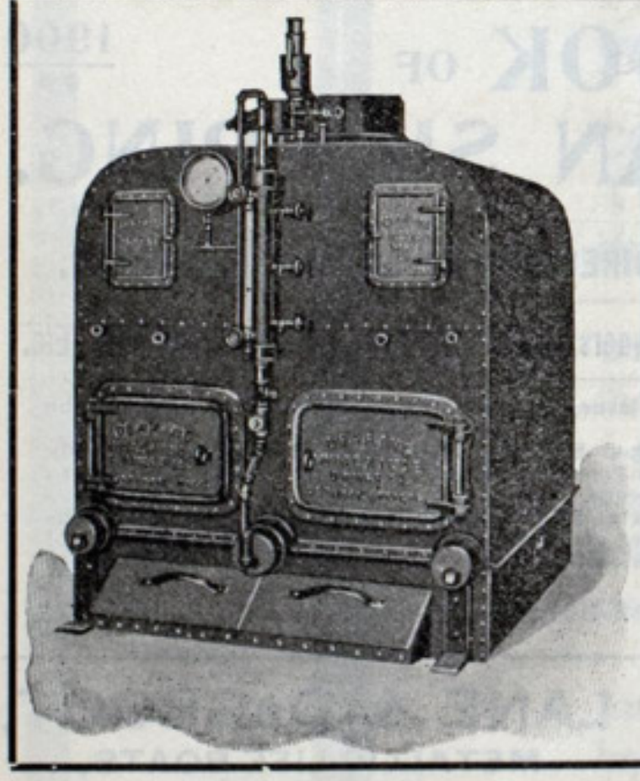

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To fit any available space—long and narrow, wide and short, or exceptionally high. In any shape it will always fulfill our guarantee to produce the maximum of power with the minimum of space and weight.

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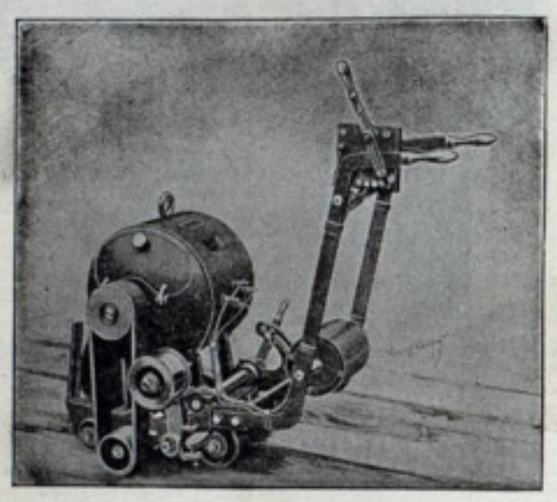

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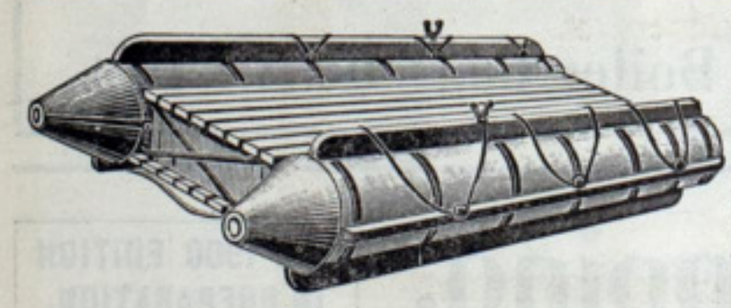

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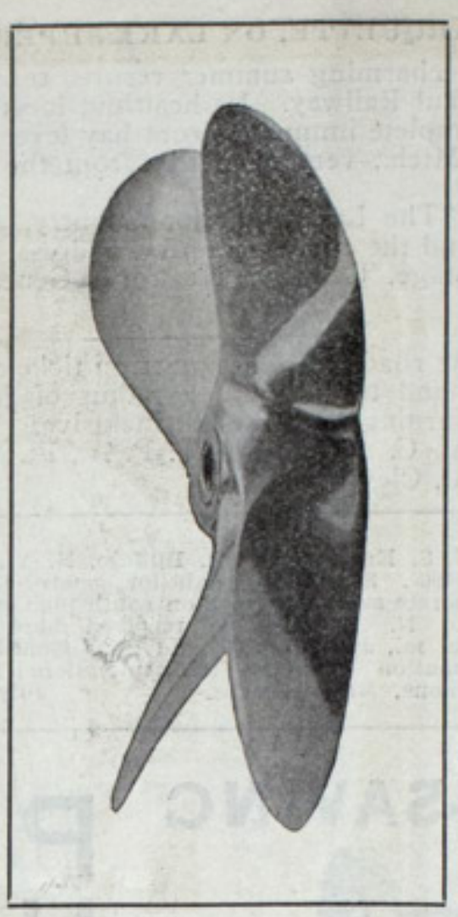

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EDWARD SMITH,
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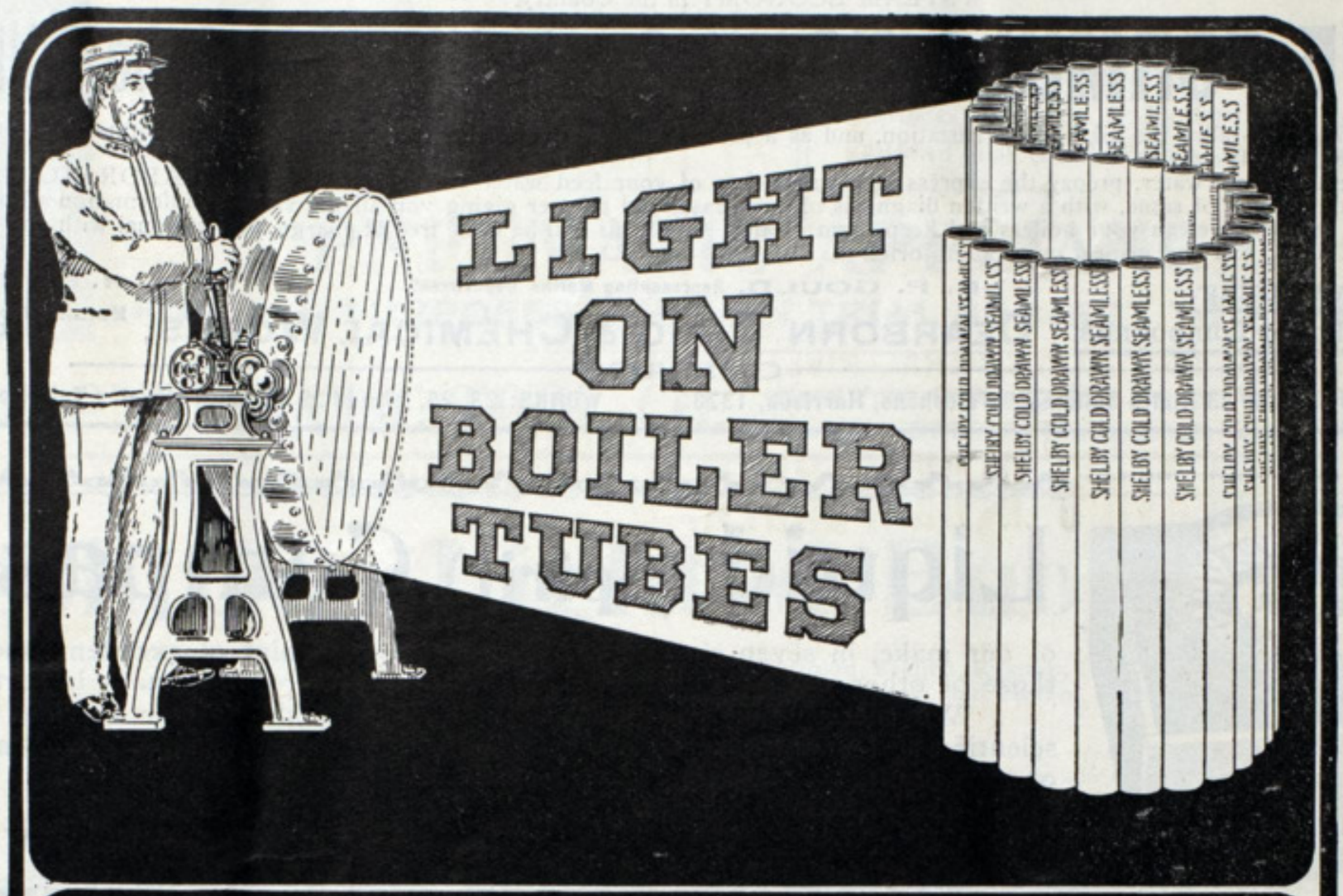

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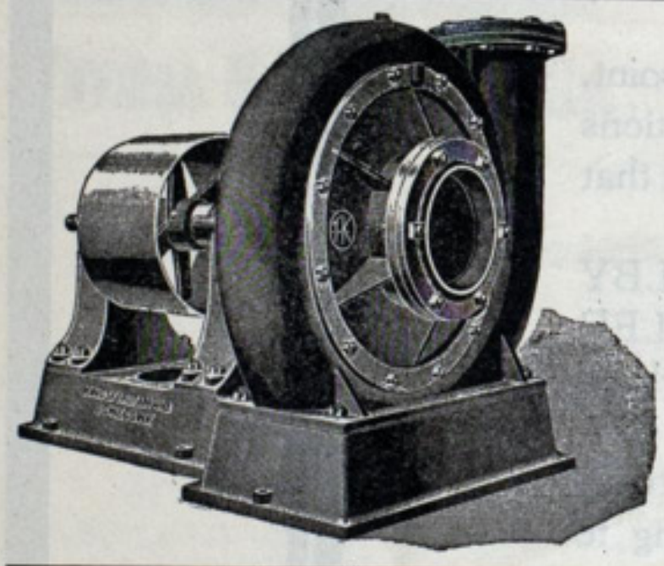

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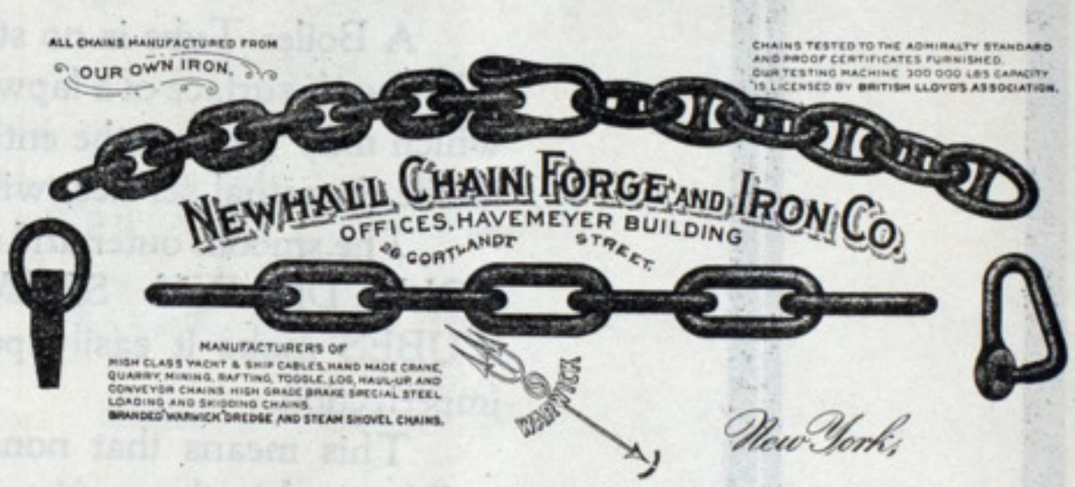

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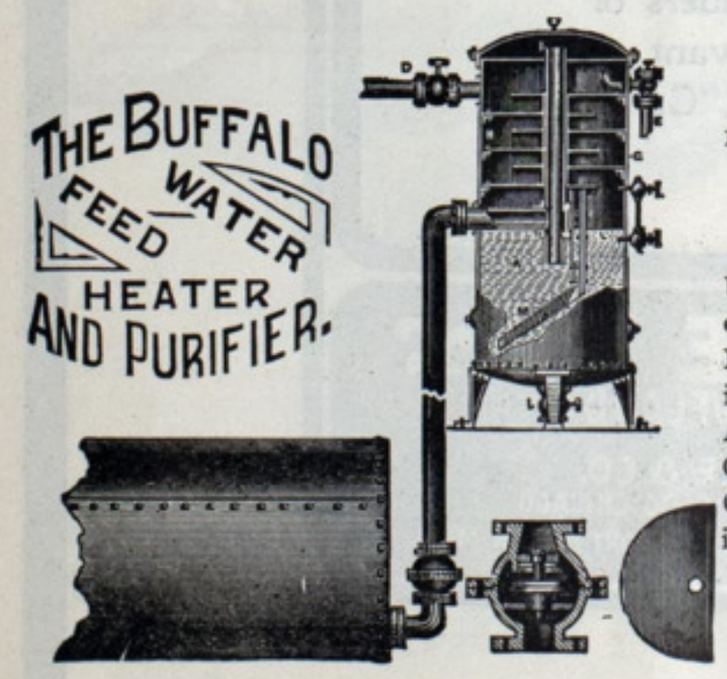

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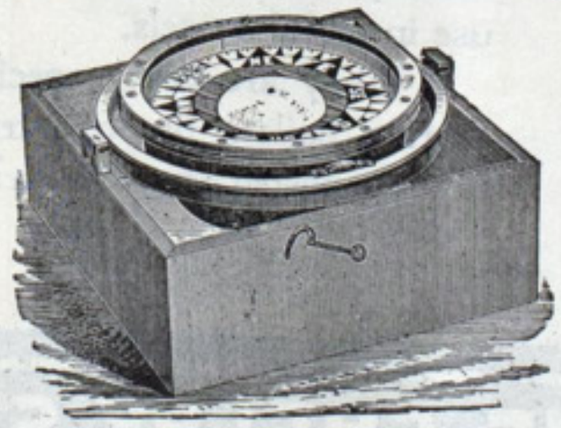

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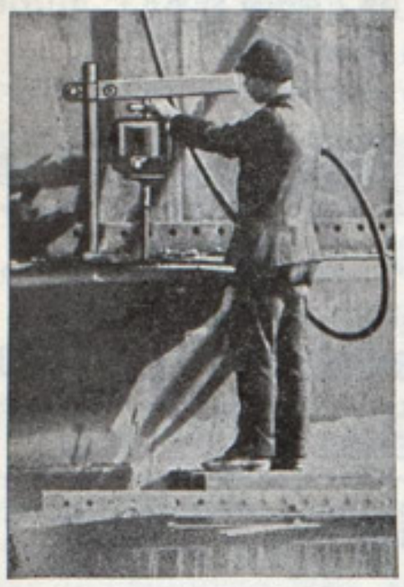

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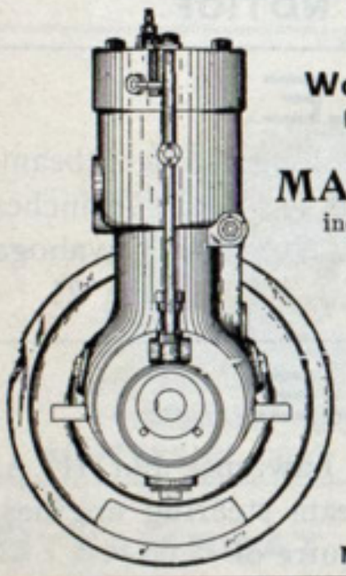

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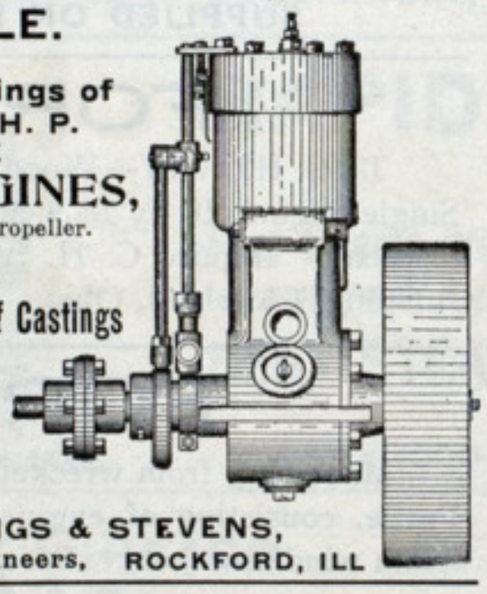

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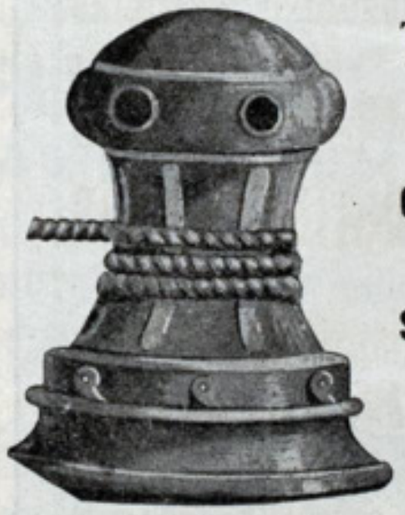

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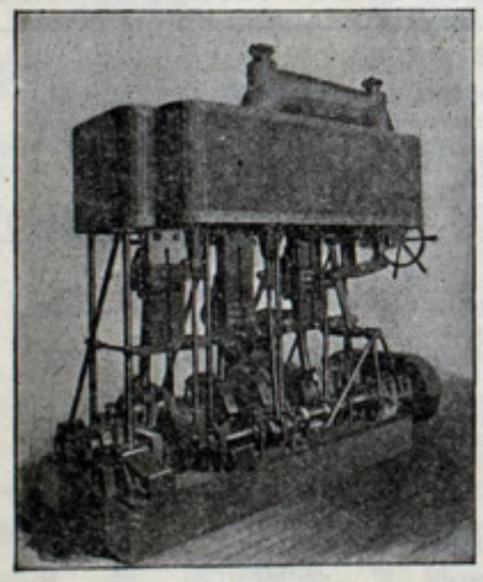

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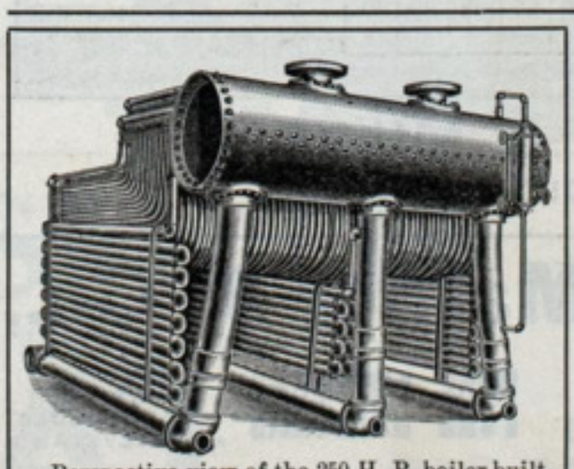

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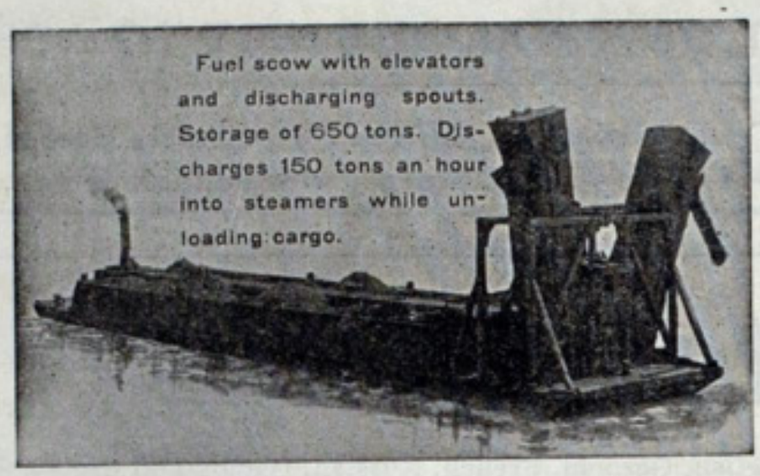

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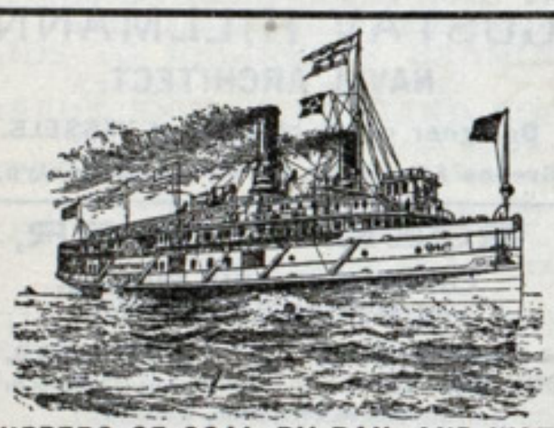

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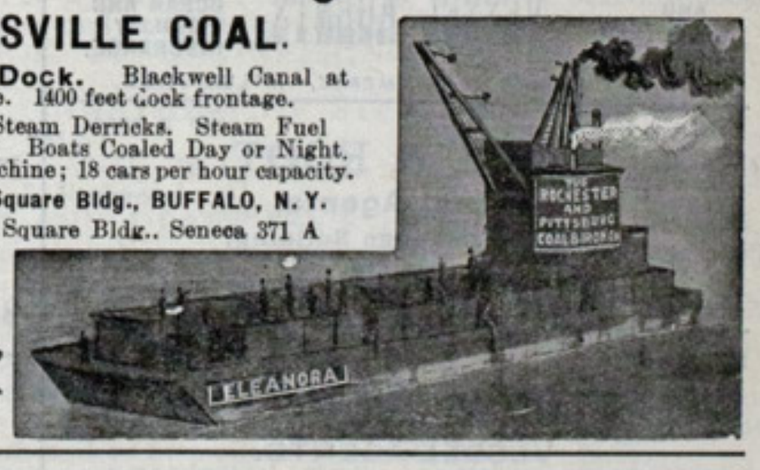

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Sterling Lubricator Co.....Rochester, N. Y.

MACHINE TOOLS.
American Tool Works Co. (The).....Cincinnati.
Bement, Miles & Co.....Philadelphia.
Pelton Engineering Co.....Cleveland.

MACHINE TOOLS (WOOD WORKING).
Egan Co., The.....Cincinnati.
Fay, J. A. & Co.....Cincinnati.
Woods Machine Co., S. A.....So. Boston.

MATTRESSES, CUSHIONS, BEDDING.
Fogg, M. W.....New York.
Mechanical Fabric Co.....Providence, R. I.

METALLIC PACKING.
Katzenstein, L. & Co.....New York.
Phenix Metallic Packing Co.....Chicago.
U. S. Metallic Packing Co.....Philadelphia.

METALS FOR BEARINGS.
Cramp, Wm. & Sons.....Philadelphia.
Illinois Smelting & Refining Works.....Chicago.
Magnolia Metal Co.....New York.
Phosphor Bronze Smelting Co., Ltd...Philadelphia.

METAL POLISH.
Bertram's Oil Polish Co.....Boston, Mass.

MILLING MACHINES OF ALL KINDS.
American Tool Works Co. (The).....Cincinnati.
Bement, Miles & Co.....Philadelphia.

NAUTICAL INSTRUMENTS.
Bliss, John & Co.....New York.
Ritchie & Sons, E. S.....Brookline, Mass.

NAVAL ARCHITECTS.
Curr, Robert.....Cleveland.
Hillman, Gustav.....Brooklyn.
See, Horace.....New York.
Wood, W. J.....Chicago.

NICKEL STEEL FORGINGS.
Bethlehem Steel Co.....So. Bethlehem, Pa.

OAKUM.
Stafford Oakum Co., Geo.....Jersey City, N. J.

OILS AND LUBRICANTS.
Dixon Crucible Co., Jos.....Jersey City, N. J.
Standard Oil Co.....Cleveland.

PACKING.
Jenkins Bros.....New York.
Katzenstein, L. & Co.....New York.
Phenix Metallic Packing Co.....Chicago.
U. S. Metallic Packing Co.....Philadelphia.

PAINTS.
Baker, Howard H. & Co.....Buffalo.
Smith, Edward & Co.....New York.
Upson-Walton Co.....Cleveland.

PAINTING MACHINES, PNEUMATIC.
Chicago Pneumatic Tool Co.....Chicago.

PATENT ATTORNEYS.
Thurston & Bates.....Cleveland.

PATTERN SHOP MACHINERY.
Egan Co., The.....Cincinnati.
Fay, J. A. & Co.....Cincinnati.
Woods Machine Co., S. A.....So. Boston.

PIPE, WROUGHT IRON.
Bourne-Fuller Co.....Cleveland.

PLANERS OF ALL KINDS.
American Tool Works Co. (The).....Cincinnati.
Bement, Miles & Co.....Philadelphia.

PLANING MILL MACHINERY.
Egan Co., The.....Cincinnati.
Fay, J. A. & Co.....Cincinnati.
Woods Machine Co., S. A.....So. Boston.

PLUMBING, MARINE.
Ellis Marine Plumbing Co.....New York.
Mott Iron Works, J. L.....New York.
Sands, Alfred B. & Son.....New York.
Kenney, The Co.....New York.

PNEUMATIC TOOLS.
Chicago Pneumatic Tool Co.....Chicago.
Philadelphia Pneumatic Tool Co.....Philadelphia.
Standard Pneumatic Tool Co.....Chicago.

POLISH FOR METALS.
Bertram's Oil Polish Co.....Boston, Mass.

PROPELLER WHEELS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works Ltd.....Bath, Me.
Case, A. Wells & Son.....Highland Park, Conn.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo.
Fore River Engine Co.....Weymouth, Mass
Hardy, John B.....Tacoma, Wash.
Hyde Windlass Co.....Bath Me.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
MacKinnon Mfg Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Morse Iron Works & Dry Dock Co.....Brooklyn.
Neafie & Levy Ship & Eng. Bldg Co...Philadelphia.
Newport News Ship Bldg. Co..Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Phosphor Bronze Smelting Co., Ltd. Philadelphia.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Sheriffs Mnfg. Co.....Milwaukee.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G.....Buffalo.
Union Iron Works.....San Francisco.
Wolff & Zwicker Iron Works.....Portland, Ore.

PROJECTORS, ELECTRIC.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Sprague Electric Co.....New York.
Westinghouse Electric & Mnfg. Co...Pittsburg, Pa.

PUMPS FOR VARIOUS PURPOSES.
Blake, Geo. F. Mnfg. Co.....New York.
Davidson, M. T.....Brooklyn, N. Y.
Donohue & Co., John T.....Baltimore.
Kingsford Foundry & Machine Works.....Oswego, N. Y.
Van Duzen, The E. W. Co.....Cincinnati.
Worthington, Henry R.....New York.

PUNCHES, RIVETERS, SHEARS.
American Tool Works Co. (The).....Cincinnati.
Bement, Miles & Co.....Philadelphia.
Cleveland Punch & Shear Works Co.....Cleveland.
Long & Allstatter Co.....Cincinnati.
New Doty Mnfg. Co.....Janesville, Wis.
Wood & Co., R. D.....Philadelphia.

REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes Register.....Cleveland.

RELEASING HOOKS FOR DETACHING BOATS.
Standard Aut. Releasing Hook Co.....New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.
Bourne-Fuller Co.....Cleveland.
Champion Rivet Co.....Cleveland.

RIGGING ROPE (WIRE).
American Steel & Wire Co.....Chicago.

RUBBER INSULATED WIRES.
Roebling's Sons, John A..New York and Cleveland.
American Steel & Wire Co.....Chicago.

SAFETY VALVES.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

SAIL MAKERS.
Baker, Howard H. & Co.....Buffalo.
Upson-Walton Co.....Cleveland.
Wilson & Silsby.....Boston.

SALVAGE COMPANIES.
See wrecking companies.

SCREW MACHINES.
American Tool Works Co. (The).....Cincinnati.
Bement, Miles & Co.....Philadelphia.

SEARCH LIGHTS.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Sprague Electric Co.....New York.
Westinghouse Electric & Mnfg. Co...Pittsburg, Pa.

SEPARATORS, (CENTRIFUGAL).
Keystone Engine & Machine Works, W. L. Simpson, Engineer.....Philadelphia.

SHAPERS.
American Tool Works Co. (The).....Cincinnati.

SHEARS.
See punches, riveters and shears.

SHIP AND BOILER PLATES AND SHAPES.
Bourne-Fuller Co.....Cleveland.

SHIP BUILDERS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Buffalo Dry Dock Co.....Buffalo.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Shipbuilding Co.....Detroit.
Fore River Engine Co.....Weymouth, Mass.
Hardy, John B.....Tacoma, Wash.
Harlan & Hollingsworth Co.....Wilmington, Del.
Iowa Iron Works.....Dubuque, Ia.
Jenks Ship Building Co.....Port Huron, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Morse Iron Works & Dry Dock Co.....Brooklyn.
Neafie & Levy Ship & Eng. Bldg. Co..Philadelphia.
Newport News Ship Bldg. Co...Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard.....Chester, Pa.
Townsend & Downey Ship Bldg. Co.....New York.
Trigg, Wm. R. Co.....Richmond, Va.
Union Dry Dock Co.....Buffalo.
Union Iron Works.....San Francisco.
Wolff & Zwicker Iron Works.....Portland, Ore.

SHIP CHANDLERS.
Baker, Howard H. & Co.....Buffalo.
Marine Supply Co.....Fairport Harbor, O.
Moran, Bros. Co.....Seattle, Wash.
Upson-Walton Co.....Cleveland.

SLING FRAME FOR HANDLING BARRELS.
Patriarche, H. R.....Milwaukee.

SPARS—LARGE SIZES.
Moran Bros. Co.....Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSEL FOR SALE.
Holmes, Samuel.....New York.

STEEL OR IRON STAYBOLTS, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

STEAMSHIP LINES, PASS. AND FREIGHT.
American Line.....New York.
Erie & Western Trans. Co.....Buffalo.
International Nav. Co.....Philadelphia.
Red Star Line.....New York.

STEEL SHAFTS, SOLID OR HOLLOW.
Bethlehem Steel Co.....So. Bethlehem, Pa.

STEERING APPARATUS.
American Ship Building Co.....Cleveland.
Chase Machine Co.....Cleveland.
Detroit Shipbuilding Co.....Detroit.
Donohue & Co., John T.....Baltimore.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Queen City Engineering Co.....Buffalo.
Sheriffs Mfg. Co.....Milwaukee.

STOKERS FOR MARINE SERVICE.
American Stoker Co.....New York.

STOCKS, BONDS, SECURITIES.
Wright, Herbert & Co.....Cleveland.

STOCKLESS ANCHORS.
Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.

STRUCTURES OF STEEL, BUILDERS OF.
Berlin Iron Bridge Co.....East Berlin, Conn.

SURVEYORS, MARINE.
Curr, Robert.....Cleveland.
Gibbs & Joys.....Milwaukee.

TELEGRAPH—DECK AND ENGINE ROOM.
Cory, Chas. & Son.....New York.

TESTS OF MATERIAL.
Hunt, Robert W. & Co.....Chicago.
Pittsburgh Testing Laboratory, Ltd.....Pittsburgh.

THRUST COLLARS FOR PROPELLER SHAFTS.
Ball Bearing Co.....Boston, Mass.

TIMBER—LARGE PIECES.
Moran Bros. Co.....Seattle, Wash.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.
American Tool Works Co. (The).....Cincinnati.
Bement, Miles & Co.....Philadelphia.
Chicago Pneumatic Tool Co.....Chicago.
Cleveland Punch & Shear Works Co. ...Cleveland.
Long & Allstatter, The Co.....Hamilton, O.
New Doty Mnfg. Co.....Janesville, Wis.
Pelton Engineering Co.....Cleveland.
Philadelphia Pneumatic Tool Co.....Philadelphia.
Standard Pneumatic Tool Co.....Chicago.
Wood & Co., R. D.....Philadelphia.

TOOLS, WOOD WORKING.
Egan Co., The.....Cincinnati.
Fay, J. A. & Co.....Cincinnati.
Woods Machine Co., S. A.....So. Boston.

TRUCKS.
Boston & Lockport Block Co.....Boston, Mass.

TOWING MACHINES.
American Ship Windlass Co.....Providence, R. I.
Chase Machine Co.....Cleveland.

TOWING COMPANIES.
Calvin Co., The.....Kingston, Ont.
Donnelly Salvage & Wrecking Co...Kingston, Ont.
Swain Wrecking Co.....Detroit.

TUBING FOR BOILERS.
Atlantic Tube Co.....Pittsburg.
Shelby Steel Tube Co.....Cleveland.

TUBES, SEAMLESS DRAWN, BRASS AND COPPER.
Hungerford Brass & Copper Co., U. T.....New York.

VALVES, STEAM SPECIALTIES, ETC.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.
Jenkins Bros.....New York.

VARNISH MAKERS, COLOR GRINDERS, ETC.
Smith, Edward & Co.....New York.

VARNISH PAINT.
Mair, John & Son.....Philadelphia.

VESSEL AND FREIGHT AGENTS.
Boland, John J.....Buffalo.
Brown & Co.....Buffalo.
Bull & Co, A. H.....New York.
Drake & Maytham.....Buffalo.
Elphicke, C. W. & Co.....Chicago.
Gibbs & Joys.....Milwaukee.
Hall & Root.....Buffalo.
Hawgood & Moore.....Cleveland.
Helm, D. T. & Co.....Duluth, Minn.
Holmes, Samuel.....New York.
Hutchinson & Co.....Cleveland.
Keith, J. G. & Co.....Chicago.
Mitchell & Co.....Cleveland.
Moffat & O'Brien.....San Francisco.
Pauly, H. J.....Milwaukee.
Richardson, W. C.....Cleveland.

VENTILATING APPARATUS FOR SHIPS.
Buffalo Forge Co.....Buffalo.
Sprague Electric Co.....New York.
Sturtevant Co., B. F.....Boston.

WIRE ROPE AND WIRE ROPE FITTINGS.
American Steel & Wire Co.....Chicago.
Baker, H. H. & Co.....Buffalo.
Roebling's Sons, John A..New York and Cleveland.
Upson-Walton Co.....Cleveland.

WHISTLES, STEAM.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.
Signal & Control Co.....New York.

WINDLASSES.
American Ship Windlass Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.

WINCHES.
American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

WOOD WORKING MACHINERY.
Egan Co., The.....Cincinnati.
Fay, J. A. & Co.....Cincinnati.
Woods Machine Co., S. A.....So. Boston.

WORM GEARING.
Morse, Williams & Co.....Philadelphia.

WRECKING AND SALVAGE COMPANIES.
Calvin Co., The.....Kingston, Ont.
Donnelly Salvage & Wrecking Co...Kingston, Ont.
Playfair's Barge & Tug Line.....Midland, Ont.
Swain Wrecking Co.....Detroit.

YACHT SAILS, FITTINGS, HARDWARE, ETC.
Wilson & Silsby.....Boston.

YACHT AND BOAT BUILDERS.
Drein, Thos. & Son.....Wilmington, Del.
Electric Boat Co.....New York.
Gas Engine & Power Co.....New York.
Lane & DeGroot.....Brooklyn.

YACHT, MARINE AND SHIPS' BELL CLOCKS.
Ashton Valve Co.....Boston.
Bliss, John & Co.....New York.
Chelsea Clock Co.....Boston.
Ritchie, E. S. & Sons.....Brookline, Mass.

YAWLS.
Drein, Thos. & Son.....Wilmington, Del.
Lane & DeGroot.....Brooklyn.

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STEEL AND WOOD VESSELS, STEAM OR SAIL

FOR OCEAN, SOUND AND RIVER SERVICE

FOUNDRY, MACHINE, BOILER AND FORGE SHOPS

LARGEST TOOLS AND EQUAL TO ANY REQUIREMENT

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DRY DOCK AND MARINE RAILWAY

Two-Section balanced floating dry dock, 400 ft. long, 60 ft. between towers; patent steel wedge keel blocks; 12,000 tons displacement.

CAPACITY OF MARINE RAILWAY 1500 TONS

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CAPACITY: TIMBER, 48 INCHES SQUARE, 125 FEET LONG including every description of ROUGH, DRESSED or KILN DRIED

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We make a specialty of long and large timber and can DRESS FOUR SIDES 20 x 30 INCHES.

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DOCK SHIPMENTS TO ALL PARTS OF THE WORLD

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LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CLEVELAND CITY TICKET OFFICE,
237 SUPERIOR STREET.

	Eastward:—	Ar. fr. West.	Dep. East.
No. 18,	Southwestern Limited	.....	*1 55 am
No. 22,	Lake Shore Limited	*2 15 am	*2 20 am
No. 28,	New York & Boston Express	*7 40 am	*8 00 am
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No. 2,	Day Express	†9 05 pm	†9 20 pm
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No. 40,	Toledo & Buffalo Accom., via Norwalk.	†10 00 am	†10 30 am
No. 126,	Norwalk Accommodation	†7 55 am	.....
No. 116,	Conneaut Accommodation	.....	†4 30 pm

	Westward:—	Ar. fr. East.	Dep. West.
No. 11,	Southwestern Limited	*3 25 am	.....
No. 15,	New York, Boston & Chicago Special	*3 05 am	*3 10 am
No. 21,	New York & Chicago Express	*5 10 am	*5 20 am
No. 7,	Day Express	.....	†6 30 am
No. 19,	The Lake Shore Limited	*7 35 am	*7 40 am
No. 23,	Western Express	*11 10 am	*11 15 am
No. 33,	Southwestern Express	*12 25 pm	.....
No. 133,	United States Express	.....	*12 40 pm
No. 47,	Accommodation	.....	†3 00 pm
No. 141,	Sandusky Accommodation	.....	†3 10 pm
No. 127,	Norwalk Accommodation	.....	†5 10 pm
No. 37,	Pacific Express	*6 35 pm	*7 00 pm
No. 3,	Fast Mail Limited	*10 50 pm	*10 55 pm

*Daily. †Daily except Sunday.
Trains Nos. 28 and 37 run via Erie station.

HALF RATES—TO—KANSAS CITY VIA BIG FOUR ROUTE

Account Democratic National Convention, Kansas City, July 4, 1900.

One Fare Round Trip.

Tickets will be on sale July 1, 2 and 3, good for continuous passage in each direction, and will be good for return leaving Kansas City not later than July 9.

For full information and particulars as to rates, tickets, limits, etc., call on Agents "Big Four Route," or address the undersigned.

WARREN J. LYNCH, Genl. Pass. & Tkt. Agt. CINCINNATI, O.
W. P. DEPPE, A. G. P. & T. Agt. CINCINNATI, O.
D. JAY COLLVER, 116 Euclid Ave. CLEVELAND.

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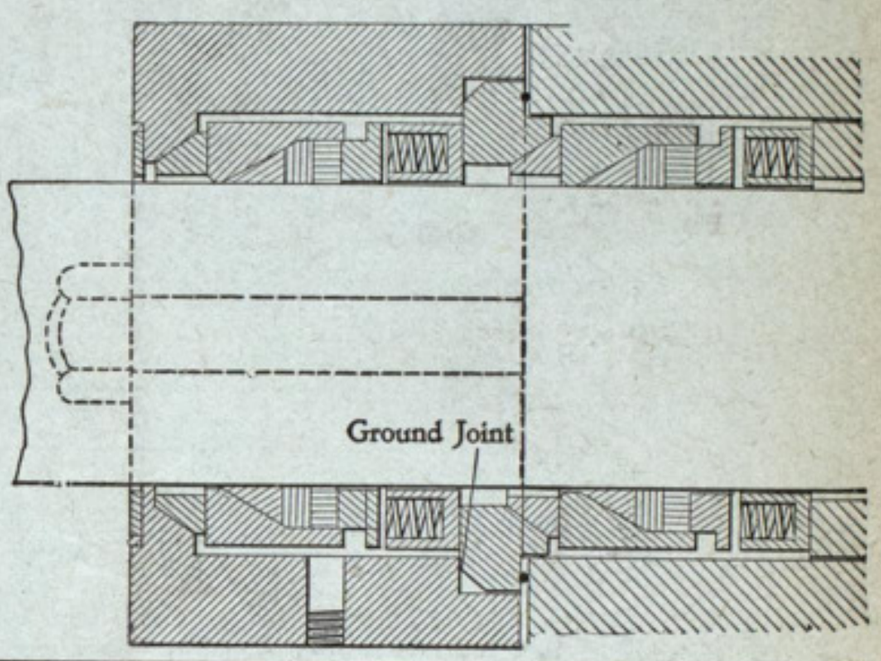

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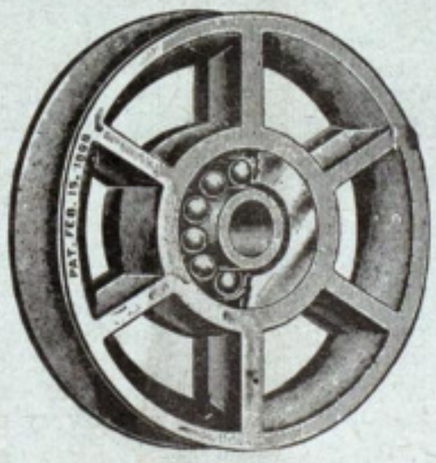

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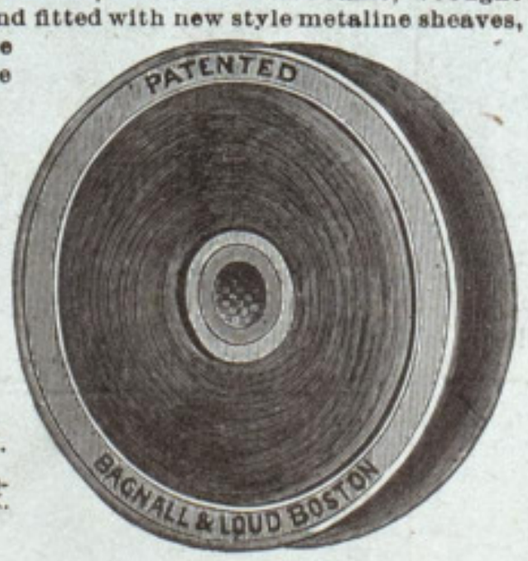

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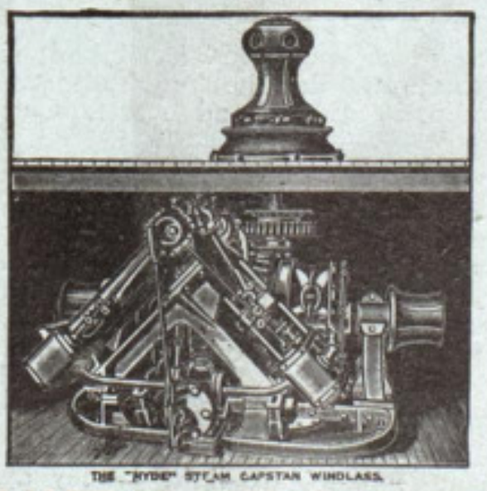

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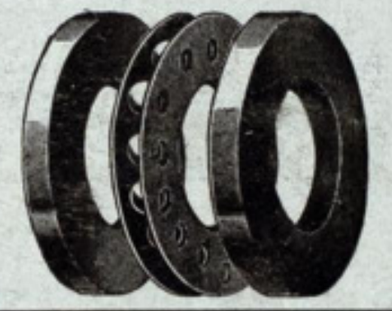

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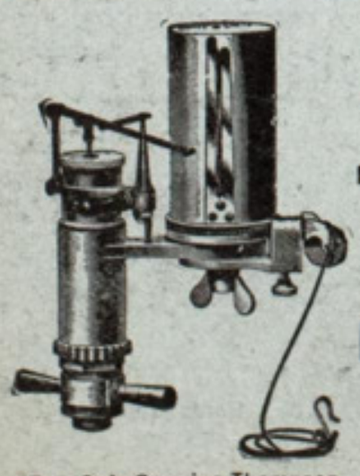

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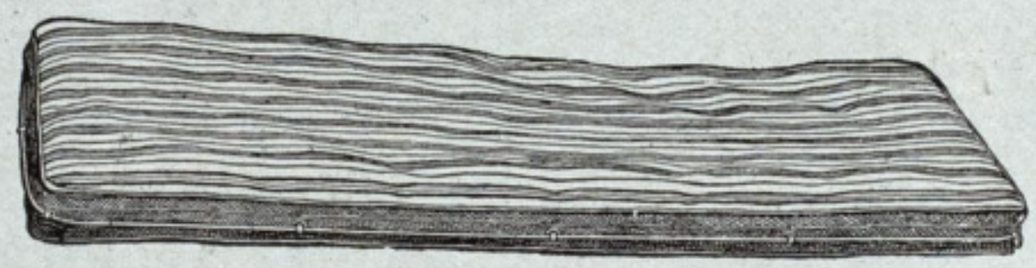

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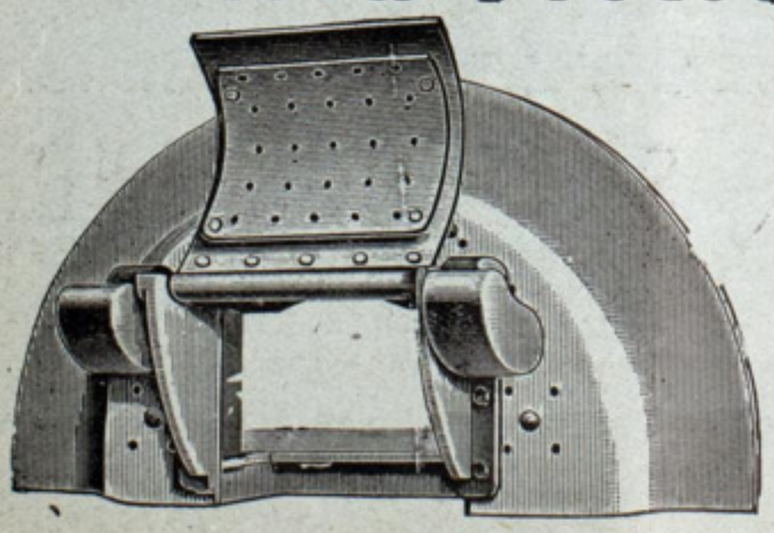

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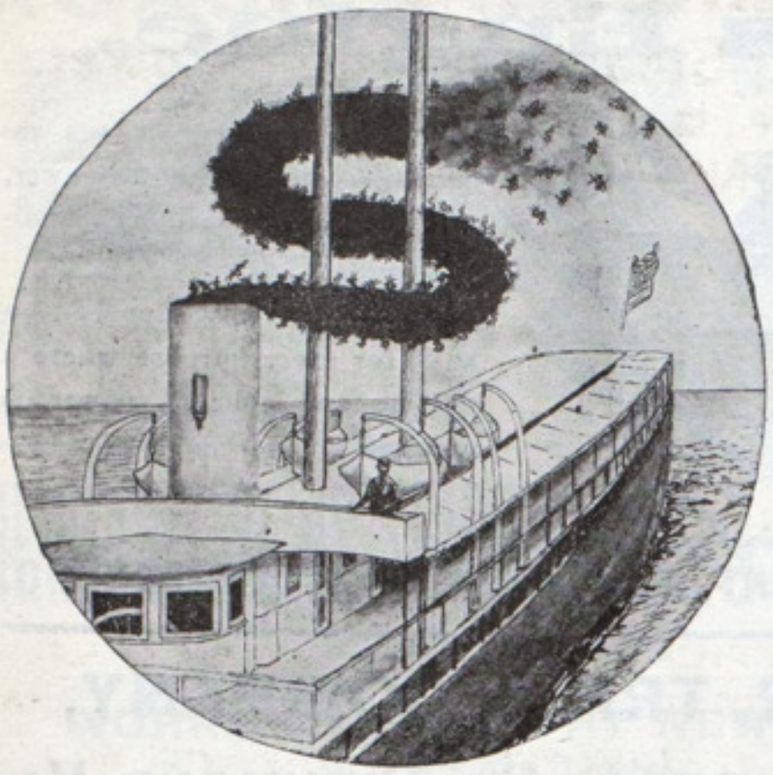

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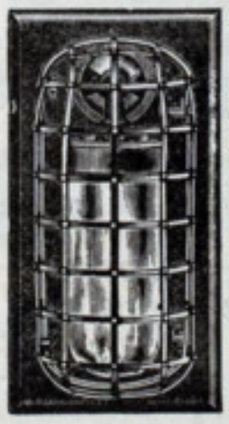

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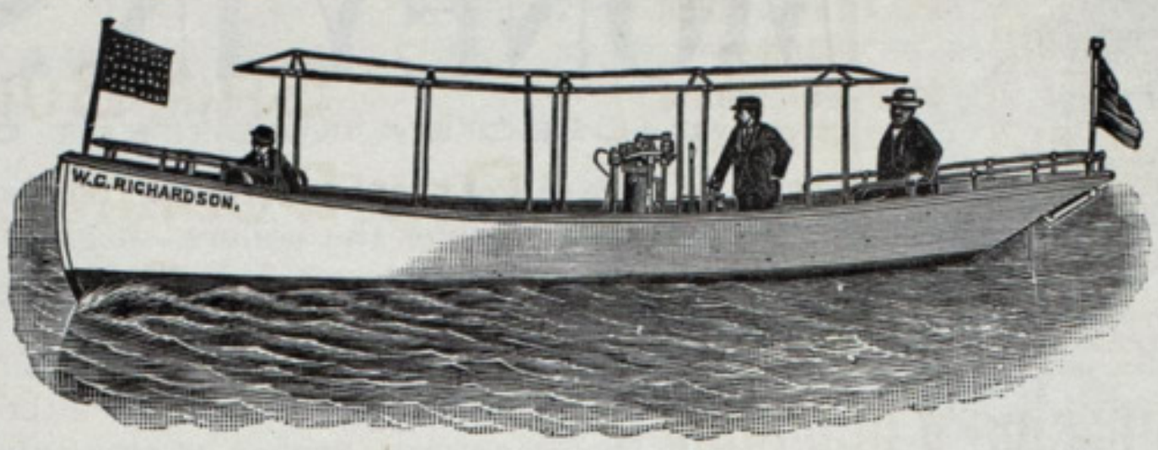

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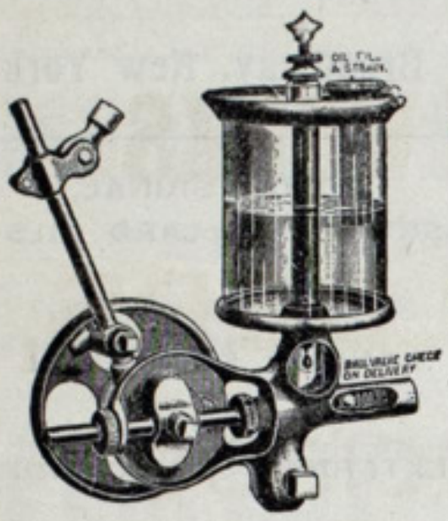

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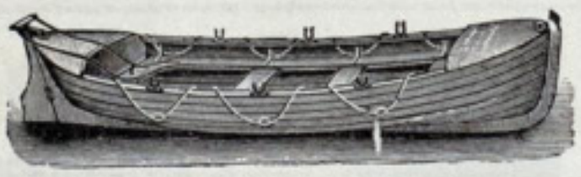

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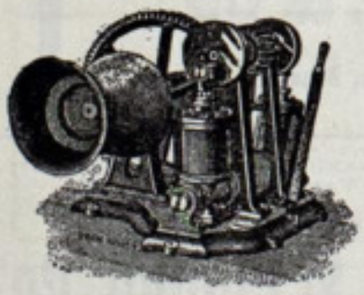

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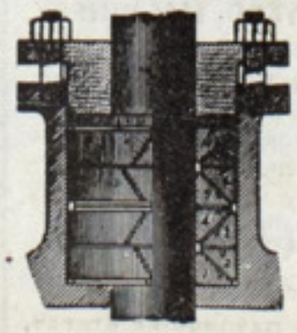

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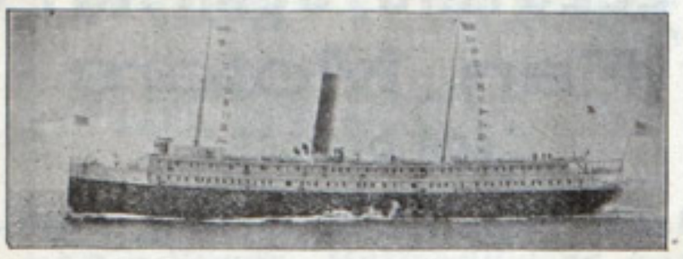

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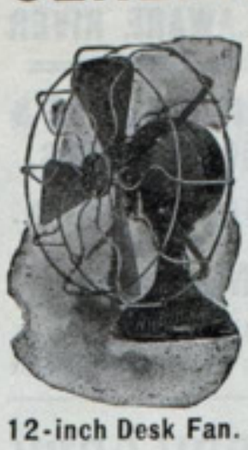

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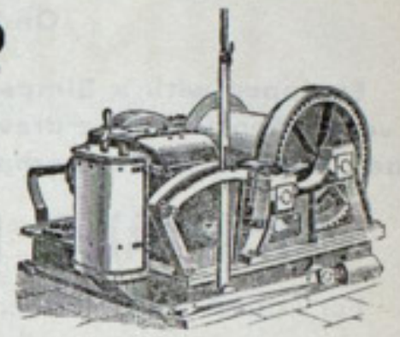

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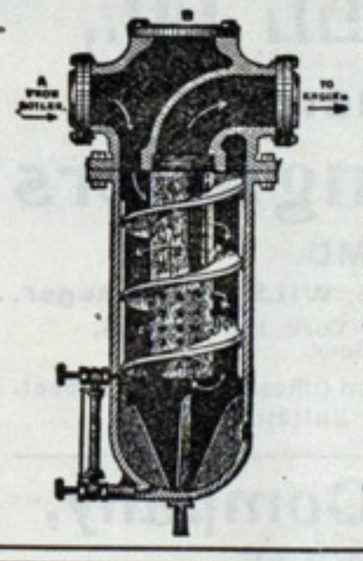

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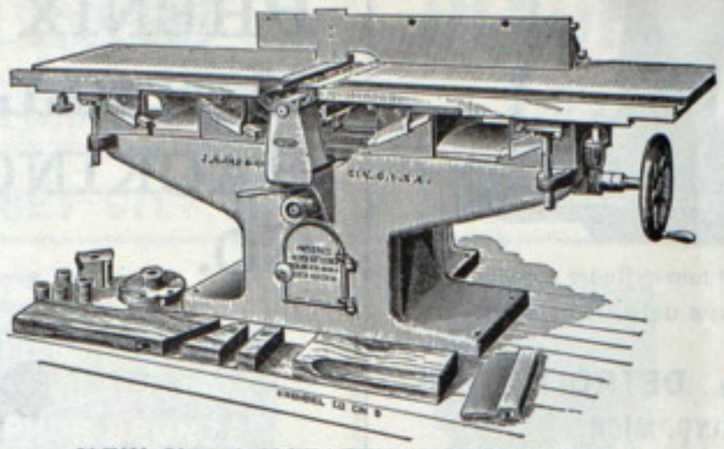

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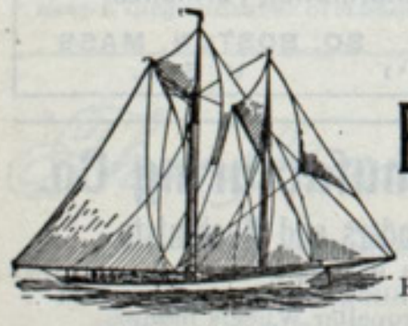

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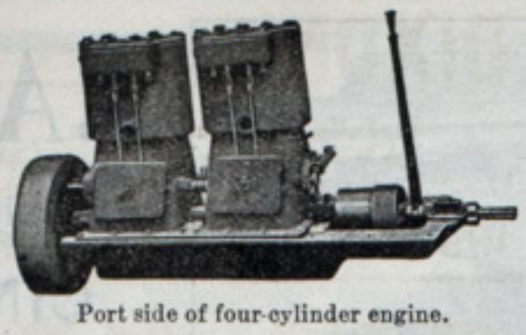

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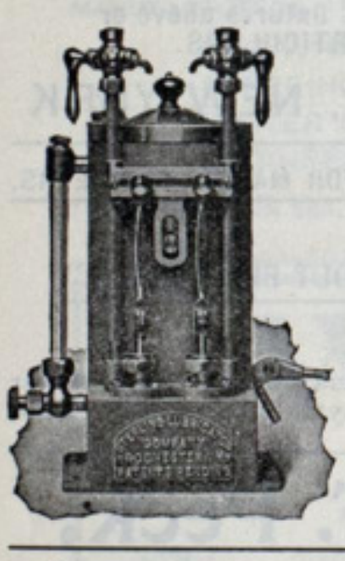

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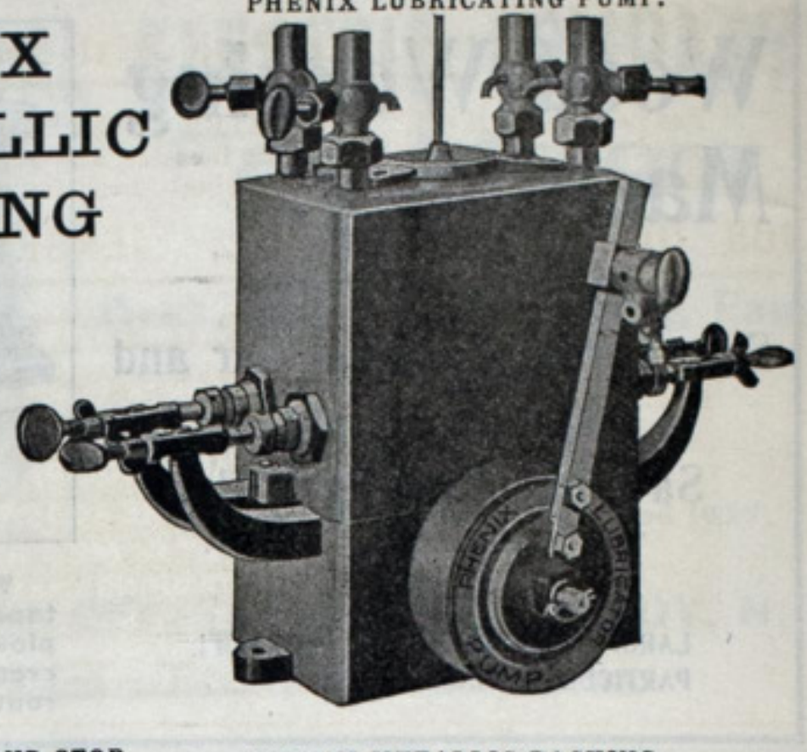

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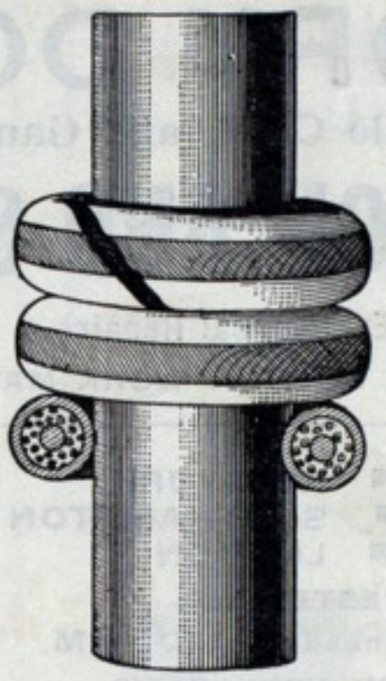

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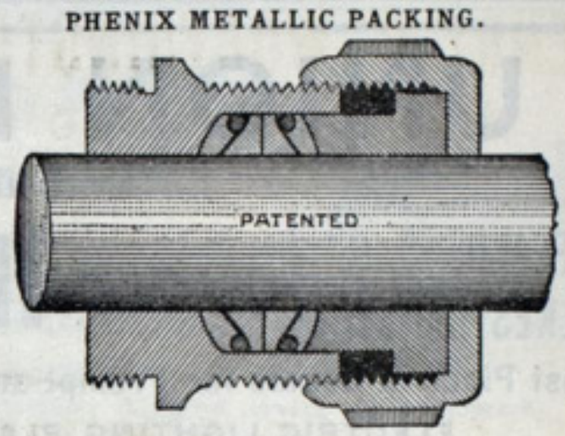

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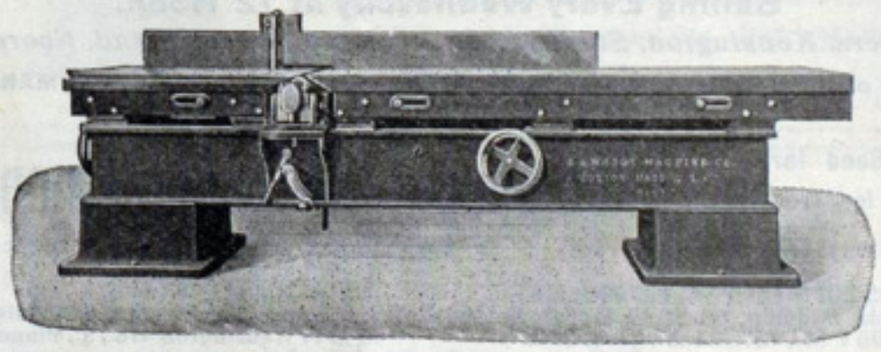

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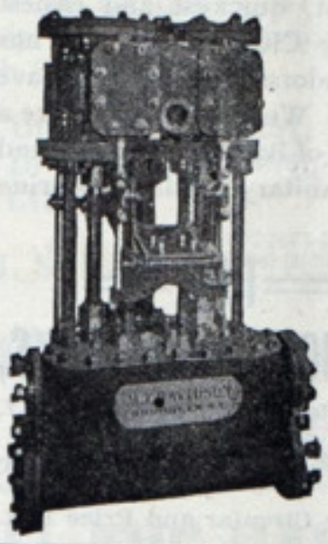

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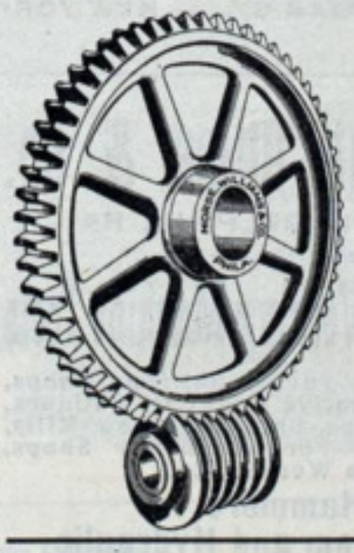

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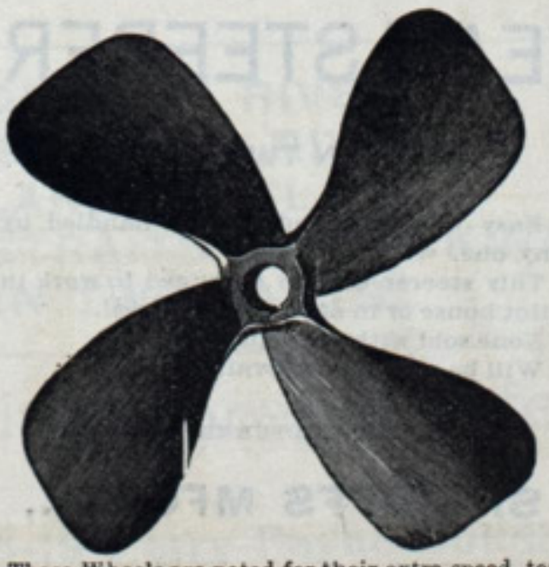

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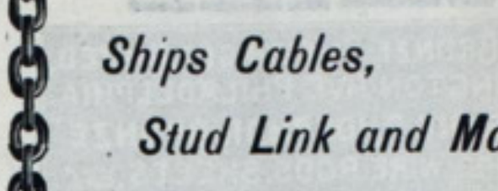

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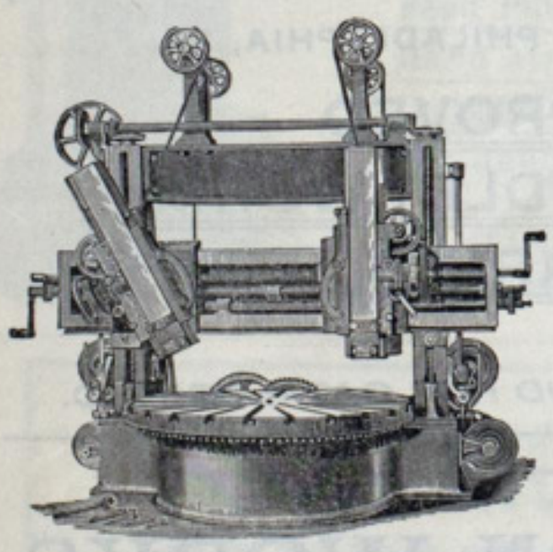

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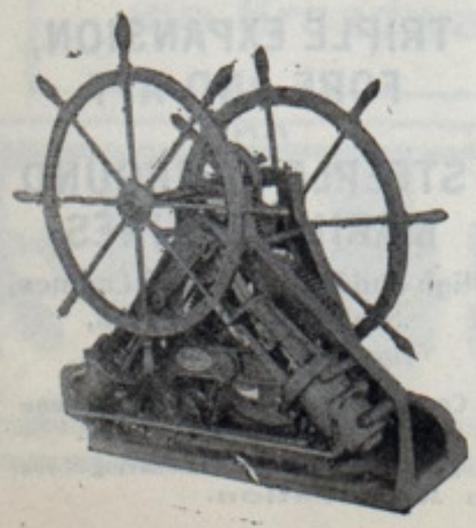

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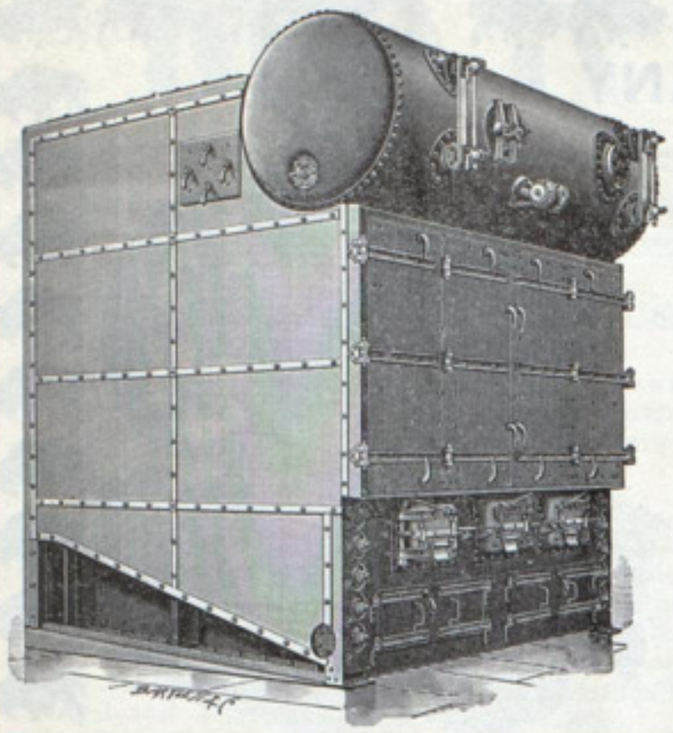

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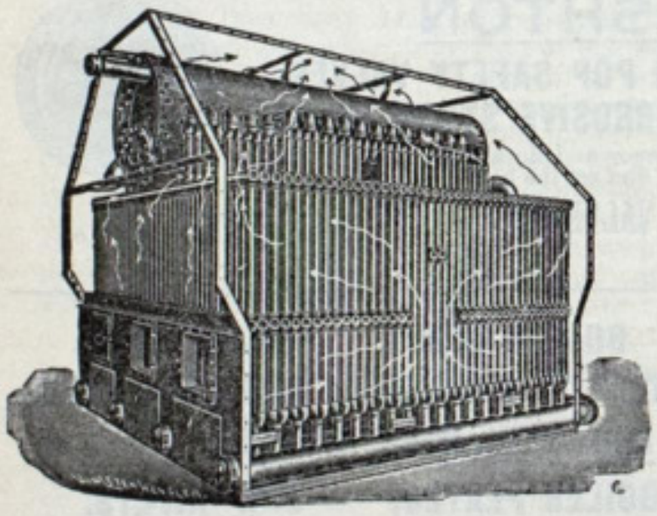

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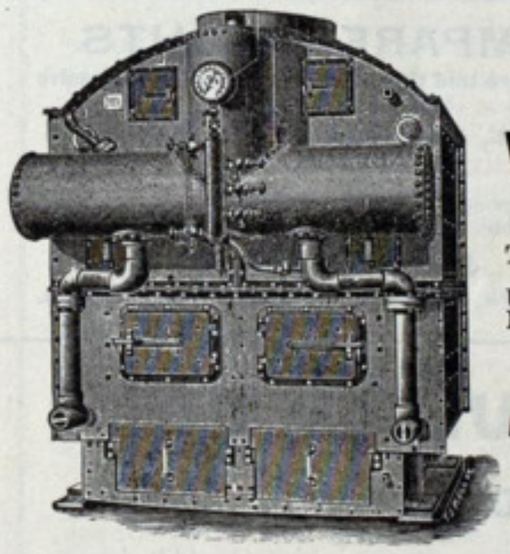

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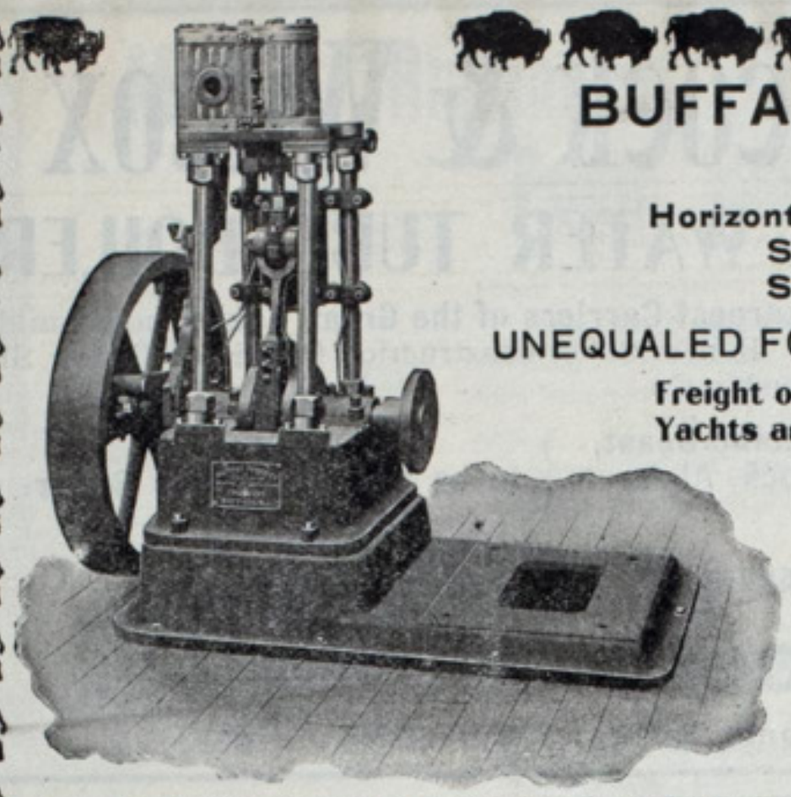

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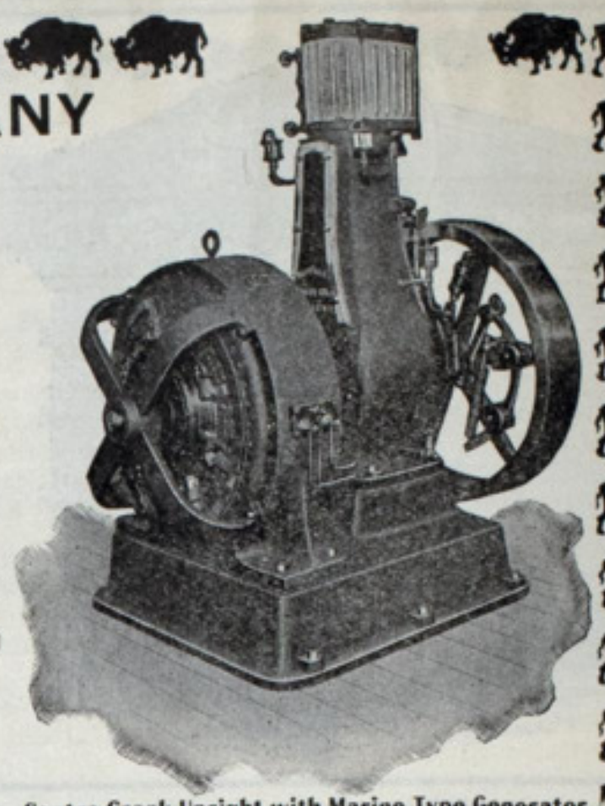

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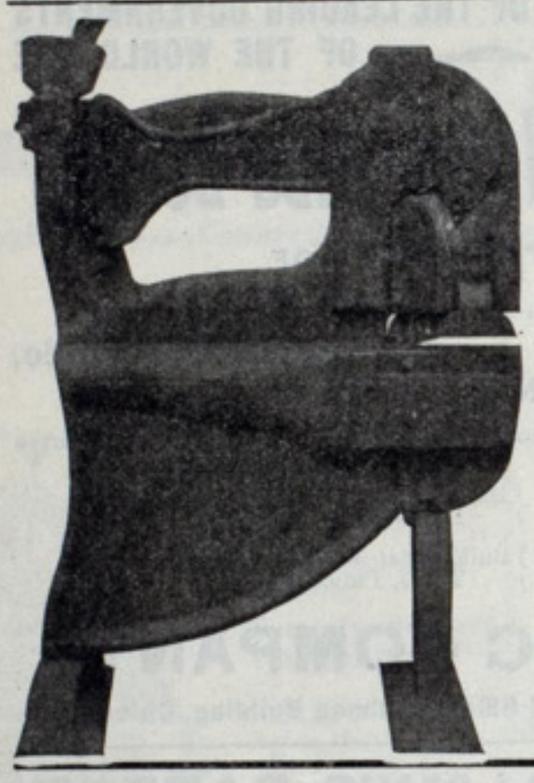

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